Increment Definition and Requirements Document for Increment 17

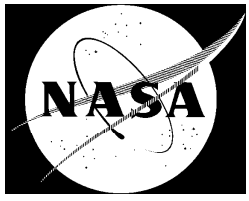
International Space Station Program

Baseline

October 2007

POCKOCMOC

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas
Contract Number: NNJ04AA02C



REVISION AND HISTORY PAGE

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	Early Release	XX-XX-XX
	Program Release	XX-XX-XX

PREFACE

INCREMENT DEFINITION AND REQUIREMENTS DOCUMENT FOR INCREMENT 17

This document is the Increment Definition and Requirements Document for Increment 17. Official delivery of this document is under control of the Space Station Control Board (SSCB). Any changes or revisions will be jointly agreed to and signed by the National Aeronautics and Space Administration (NASA) and the affected International Partners (IPs).

NASA/ROSCOSMOS

INTERNATIONAL SPACE STATION PROGRAM

INCREMENT DEFINITION AND REQUIREMENTS DOCUMENT FOR INCREMENT 17

OCTOBER 2007

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12/3/07
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INTERNATIONAL SPACE STATION PROGRAM

INCREMENT DEFINITION AND REQUIREMENTS DOCUMENT FOR INCREMENT 17

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INTERNATIONAL SPACE STATION PROGRAM

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INTERNATIONAL SPACE STATION PROGRAM

INCREMENT DEFINITION AND REQUIREMENTS DOCUMENT FOR INCREMENT 17

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	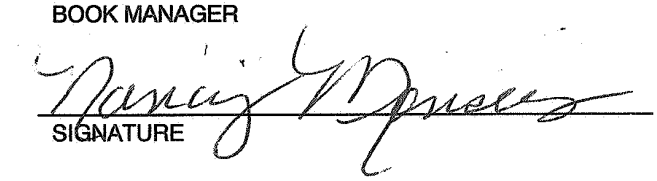 SIGNATURE	10/29/07 DATE
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	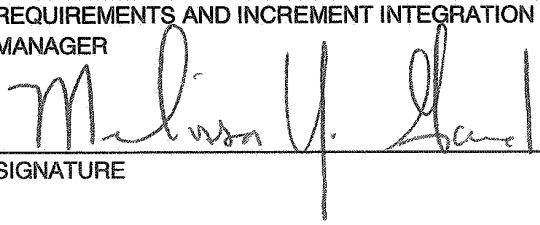 SIGNATURE	29 Oct 07 DATE
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	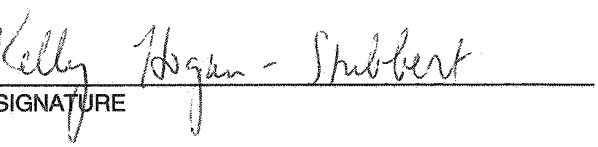 SIGNATURE	10/29/07 DATE

INTERNATIONAL SPACE STATION PROGRAM

INCREMENT DEFINITION AND REQUIREMENTS DOCUMENT FOR INCREMENT 17

LIST OF CHANGES

OCTOBER 2007

All changes to paragraphs, tables, and figures in this document are shown below:

SSCB	Entry Date	Change	Paragraph(s)
	December 2007	Baseline	All

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APPENDIX

TABLE

FIGURE

1.0 INTRODUCTION

1.1 PURPOSE

This document provides the assignment of flight dates, resources and accommodations, as well as defines the requirements for Increment 17 in Planning Period 8. Requirements are provided for both joint International Space Station (ISS)/mated vehicle operations and ISS-only continuous operations stages of the increment.

The schedule for products (i.e., documentation, reviews, etc.) that must be developed to support Increment 17 is found in the Common Schedule Database (CSD). The requirements contained herein shall be used in the execution of the flight and stage Certification of Flight Readiness (CoFR) processes carried out by each ISS supporting organization.

1.2 SCOPE

This document covers Increment 17, beginning with the launch of the Expedition (E)17 Commander (CDR) and Flight Engineer (FE)-1 on Flight 16 Soyuz and ends with their departure on Flight 16 Soyuz. The third crew member, FE-2, rotates on the Shuttle flights. At the start of Increment 17, the E16/17 FE-2 (1J/A) will have been on ISS since Flight 1J/A in Increment 16. E17 FE-2 (1J) is launched on Flight 1J and replaces E16/17 FE-2 (1J/A). E17 FE-2 (1J) returns on Flight Utilization Logistics Flight (ULF)2. The E17/18 FE-2 (ULF2) is launched on Flight ULF2 and replaces E17 FE-2 (1J). E17/18 FE-2 (ULF2) returns during Increment 18. Note that the Flight **<TBD 1-1>** that returns E17/18 FE-2 (ULF2) has requirements, including those for crew rotation, specified in Space Station Program (SSP) 540*XX* **<TBD 1-2>**.

This document is based on the ISS Flight Program definition, as specified in SSP 54100, Increment Definition and Requirements Document Flight Program.

This document defines the capabilities and objectives of Increment 17. This document also controls the following: resource and accommodation allocations between assembly, system, and utilization; requirements and priorities for ISS execution planning; ISS manifest [Increment Definition and Requirements Document for Increment 17, Annex (ANX) 1: Station Manifest (SSP 54017-16S **<TBD 1-4>**, SSP 54017-1J **<TBD 1-5>**, SSP 54017-29P **<TBD 1-6>**, SSP 54016-ATV1 **<TBD 1-7>**, SSP 54017-30P **<TBD 1-8>**, SSP 54017-31P **<TBD 1-9>**, SSP 54017-ULF2 **<TBD 1-10>**)]; On-Orbit Maintenance Plan (SSP 54017-ANX 2 **<TBD 1-11>**, Increment Definition and Requirements Document for Increment 17, Annex 2: On-Orbit Maintenance Plan); ISS imagery requirements (SSP 54017-ANX 3 **<TBD 1-12>**, Increment Definition and Requirements Document for Increment 17, Annex 3: Imagery Requirements); medical operations (SSP 54017-ANX 4 **<TBD 1-13>**, Increment Definition and Requirements Document for Increment 17, Annex 4: Medical Operations and Environmental Monitoring); and payloads (SSP 54017-ANX 5 **<TBD 1-14>**, Increment Definition and Requirements Document for Increment 17, Annex 5: Payload Tactical Plan). The above mentioned documents are published as separate documents.

1.3 PRECEDENCE

SSP 54017 will be developed in compliance with the specification documents. Deviations from the specifications are possible only as a result of specific scenarios analysis. If there are any discrepancies between this document and SSP 54100, SSP 54100 takes precedence. If there are any discrepancies between this document, SSP 50110, Multi-Increment Manifest Document, and the Consolidated Operations and Utilization Plan, this document shall take precedence.

The real-time time frame for a flight and its associated stage begins after the applicable Stage Operations Readiness Review (SORR) in accordance with the process in SSP 50200-02, Station Program Implementation Plan (SPIP) Volume 2: Program Planning and Manifesting. The differences between the “as planned” requirements in the Increment Definition and Requirements Document (IDRD) and the “real-time” requirements will be documented in SSP 543XX, Post Increment Evaluation Report for Increment 17.

This document should be used in conjunction with SSP 50261-01, Generic Groundrules, Requirements, and Constraints Part 1: Strategic and Tactical Planning. Deviations to SSP 50261-01 for this increment are documented in Paragraph 3.4.

1.4 DELEGATION OF AUTHORITY

The Space Station Control Board (SSCB) has formal control and approval of this document. All changes to this document will be processed in accordance with the procedures as specified in SSP 50123, Configuration Management Handbook.

1.5 DEVIATION/WAIVER

Any request for deviation from this document shall be made to the Space Station Program Control Board (SSPCB) in accordance with the procedures as specified in SSP 41170, Configuration Management Requirements. NASA will maintain this document and process changes per these requirements. IPs should provide any recommended changes to the NASA Mission Integration and Operations Office for processing.

2.0 DOCUMENTS

2.1 APPLICABLE DOCUMENTS

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The documents listed in this paragraph are applicable to the extent specified herein. Inclusion of applicable documents herein does not in any way supersede the order of precedence identified in Paragraph 1.3 of this document.

DOCUMENT	TITLE	TYPE
NAS15-10110	Contract NAS15-10110 between the National Aeronautics and Space Administration of the United States of America and the Russian Space Agency of the Russian Federation for Supplies and Services Relating to MIR-1 and the International Space Station: Phase One and Selected Phase Two Activities	Bilateral
No Number	Consolidated Operations and Utilization Plan	Multilateral
NSTS 21370	International Space Station Mission (1J) Integration Plan	NASA Internal
NSTS 21514	International Space Station Mission (ULF2) Integration Plan	NASA Internal
SSP 41170	Configuration Management Requirements	NASA Internal
SSP 50110	Multi-Increment Manifest Document	Multilateral
SSP 50123	Configuration Management Handbook	Multilateral
SSP 50200-02	Station Program Implementation Plan, Volume 2: Program Planning and Manifesting	Multilateral
SSP 50255	Flight Mechanics - Trajectory	Bilateral
SSP 50260	International Space Station Medical Operations Requirements Document (ISS MORD)	Multilateral
SSP 50261-01	Generic Groundrules, Requirements, and Constraints Part 1: Strategic and Tactical Planning	Multilateral
SSP 50562	ISS Program Off-Nominal Situation Plan	Multilateral

SSP 54016	Increment Definition and Requirements Document for Increment 16	Multilateral
SSP 54016-ATV1 **<TBD 1-7>**	Increment Definition and Requirements Document for Increment 16, Annex 1: Station Manifest, Flight ATV1	Multilateral
SSP 54017-1J **<TBD 1-5>**	Increment Definition and Requirements Document for Increment 17, Annex 1: Station Manifest, Flight 1J, STS-124	Multilateral
SSP 54017-16S **<TBD 1-4>**	Increment Definition and Requirements Document for Increment 17, Annex 1: Station Manifest, Flight 16S (Soyuz)	Multilateral
SSP 54017-29P **<TBD 1-6>**	Increment Definition and Requirements Document for Increment 17, Annex 1: Station Manifest, Flight 29 Progress-M	Multilateral
SSP 54017-30P **<TBD 1-8>**	Increment Definition and Requirements Document for Increment 17, Annex 1: Station Manifest, Flight 30 Progress-M	Multilateral
SSP 54017-31P **<TBD 1-9>**	Increment Definition and Requirements Document for Increment 17, Annex 1: Station Manifest, Flight 31 Progress-M	Multilateral
SSP 54017-ANX 2 **<TBD 1-11>**	Increment Definition and Requirements Document for Increment 17, Annex 2: On-Orbit Maintenance Plan	Multilateral
SSP 54017-ANX 3 **<TBD 1-12>**	Increment Definition and Requirements Document for Increment 17, Annex 3: Imagery Requirements	Multilateral
SSP 54017-ANX 4 **<TBD 1-13>**	Increment Definition and Requirements Document for Increment 17, Annex 4: Medical Operations and Environmental Monitoring	Multilateral
SSP 54017-ANX 5 **<TBD 1-14>**	Increment Definition and Requirements Document for Increment 17, Annex 5: Payload Tactical Plan	Multilateral
SSP 54017-ULF2 **<TBD 1-10>**	Increment Definition and Requirements Document for Increment 17, Annex 1: Station Manifest, Flight Utilization Logistics Flight (ULF)2, STS-126	Multilateral

SSP 54100	Increment Definition and Requirements Document Flight Program	Multilateral

2.2 REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document. These reference documents may or may not be specifically cited within the text of this document.

DOCUMENT	TITLE	TYPE
NSTS 12820	Joint Shuttle/ISS Flight Rules Volume C Joint Operations	NASA Internal
SSP 41000	System Specification for the International Space Station	NASA Internal
SSP 41160	European Space Agency Segment Specification for Columbus	Bilateral
SSP 41162	Segment Specification for the United States On-Orbit	NASA Internal
SSP 41163	Russian Segment Specification	Bilateral
SSP 41165	Segment Specification for the Japanese Experiment Module	Bilateral
SSP 50094	NASA/RSA Joint Specifications Standards Document for the ISS Russian Segment	Bilateral
SSP 50129	Interface Requirements Document International Space Station (ISS) to Automated Transfer Vehicle (ATV)	Multilateral
SSP 50439	ESA Segment Specification for the Automated Transfer Vehicle (ATV)	Bilateral
SSP 50448	Station Development Test Objectives (SDTO) Catalog	Multilateral
SSP 50478	Payload Data Library Requirements Document	NASA Internal
SSP 50621	Generic On-Orbit Stowage Capabilities And Requirements (OSCAR)	Multilateral

SSP 50699-03	USOS Certification Baseline Volume III: Flight Attitudes	Multilateral
SSP 543XX **<TBD 2-1>**	Post Increment Evaluation Report for Increment 16	Multilateral

3.0 INCREMENT DEFINITION

This section defines the Increment 17 objectives. The inclusion of objectives in this document provides ISS Program Office control of major events and emphasis during this time frame.

3.1 INCREMENT OVERVIEW

Figure 3.1-1, Increment 17 Overview, provides a high level graphical overview of the increment. It contains the increment's duration, when and where vehicles are docked to the ISS, planned crew rotations, the number of ISS crew on ISS, and the number of Shuttle and Soyuz (Sz) visiting crews.

The number of planned United States On-orbit Segment (USOS) and Russian Segment (RS) Extravehicular Activities (EVAs) are also shown in this figure. The two contingency EVAs specified in SSP 50261-01, Paragraph 4.3.2.10, are not shown in this figure.

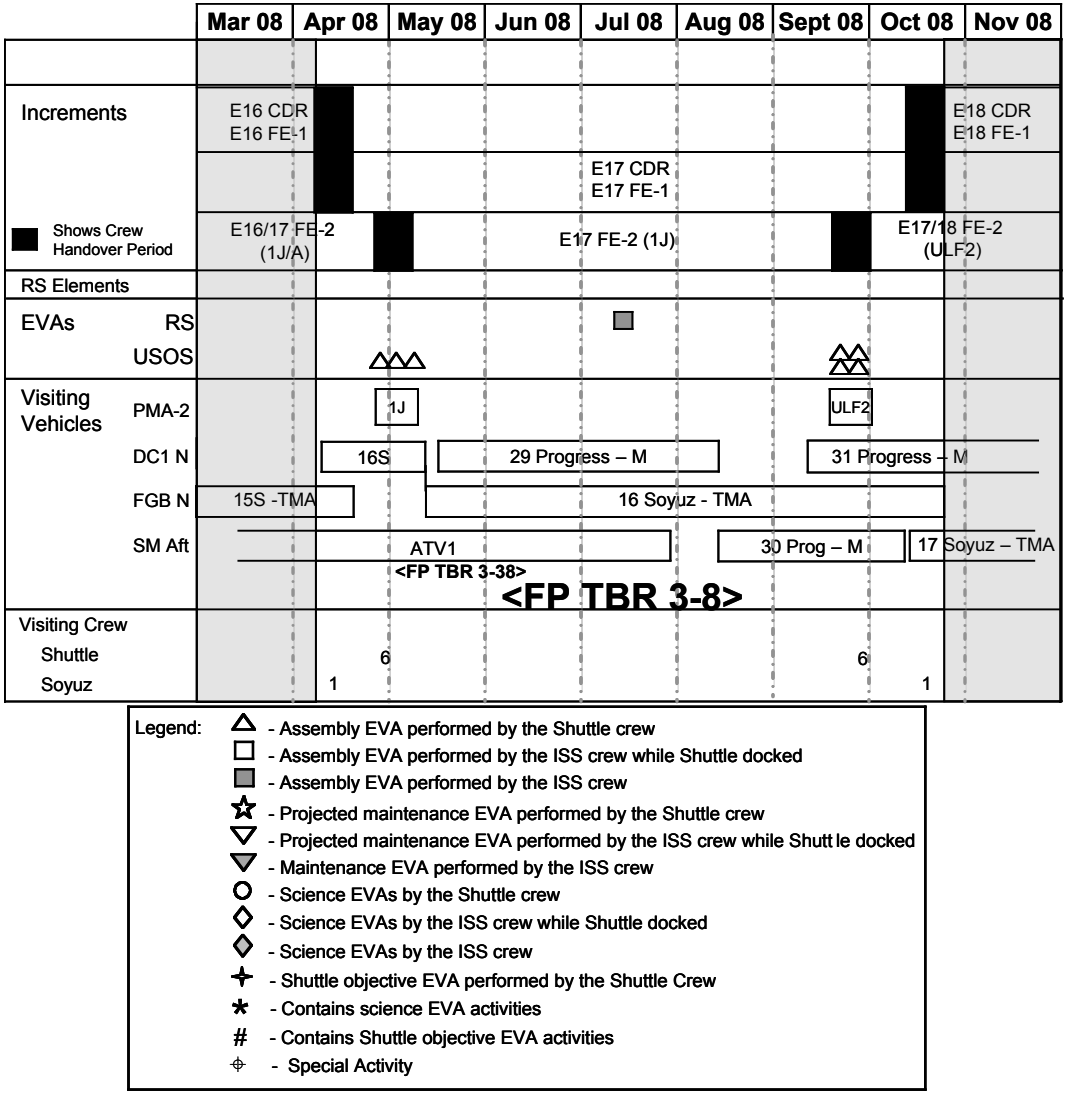

FIGURE 3.1-1 INCREMENT 17 OVERVIEW

3.2 INCREMENT FLIGHT SUMMARY

Table 3.2-1, Increment Flight Summary, identifies planning data for all flights scheduled to visit the ISS or undock from the ISS during this increment.

The mission duration column lists the planned mission duration of each flight. For Shuttle flights in this column, two numbers are listed:

1. The nominal mission duration.
2. Additional contingency days available to accomplish ISS mission objectives to cover docking problems, mated operations delays, EVA, etc.

The docked duration column lists the planned docked duration for each flight. Duration calculations are based on the calendar day difference between events.

All planning docking altitudes presented in this document represent average altitudes unless stated otherwise. Altitudes are defined in accordance with SSP 50255, Flight Mechanics - Trajectory.

For those Shuttle missions identified to be performance critical, the docking altitudes are to be maximum apogee altitude limits. ISS Flight Mechanics will coordinate with Shuttle Flight Design at the start of each increment design cycle to identify performance-critical missions. Modifications to the altitude strategy will be made in the final increment product cycle.

All launch dates in Table 3.2-1 are shown in the time standard selected by the launch vehicle organization. Space Shuttle Program dates correspond to the Kennedy Space Center (KSC) time zone. Russian dates correspond to the Decreed Moscow Time (DMT) zone. Automated Transfer Vehicle (ATV) dates correspond to the Kourou time zone.

Soyuz ascent crew size is denoted in the “Launch Vehicle Crew Size” column in Table 3.2-1, using the following convention: x+y, where x=number of Expedition crew members and y=number of Soyuz crew members. Soyuz descent crew size will be identified with a table note when it differs from ascent crew size.

Shuttle ascent crew size is denoted in the “Launch Vehicle Crew Size” column in Table 3.2-1, using the following convention: w+z, where w=number of Shuttle Transportation System (STS) crew members and z=number of Expedition crew members. Shuttle descent crew size will be identified with a table note when it differs from ascent crew size.

TABLE 3.2-1 INCREMENT FLIGHT SUMMARY

ISS Flight Name	Launch Vehicle Flight Name	Launch Vehicle Crew Size	Launch Date [5]	Mission Duration (days) [1]	Shuttle Docking Altitude (km/nmi)	Docking Date	Docked Duration (days) [1]	Undock Date
15S	Soyuz-TMA	2+1	[2]	192	-	[2]	190	19 Apr 08
ATV1	Automated Transfer Vehicle	Unmanned	[2]	180 **<FP TBR 3-38>**	-	[2]	166 **<FP TBR 3-38>**	29 July 08 **<FP TBR 3-38>**
16S	Soyuz-TMA	2+1	08 Apr 08	198 **<FP TBR 3-8>**	-	10 Apr 08 [3]	196 **<FP TBR 3-8>**	23 Oct 08 **<FP TBR 3-8>**
1J	STS-124 (OV-103)	6+1	24 Apr 08	12+2	339/183	26 Apr 08	7+1	03 May 08
29P	Progress-M	Unmanned	14 May 08 **<FP TBR 3-8>**	89 **<FP TBR 3-8>**	-	16 May 08 **<FP TBR 3-8>**	87 **<FP TBR 3-8>**	11 Aug 08 **<FP TBR 3-8>**
30P	Progress-M	Unmanned	12 Aug 08 **<FP TBR 3-8>**	60 **<FP TBR 3-8>**	-	14 Aug 08 **<FP TBR 3-8>**	58 **<FP TBR 3-8>**	11 Oct 08 **<FP TBR 3-8>**
31P	Progress-M	Unmanned	11 Sept 08 **<FP TBR 3-8>**	[4]	-	13 Sept 08 **<FP TBR 3-8>**	[4]	[4]
ULF2	STS-126 (OV-105)	6+1	18 Sept 08	15+1	352/190	20 Sept 08	11+1	01 Oct 08
17S	Soyuz-TMA	2+1	12 Oct 08 **<FP TBR 3-8>**	[4]	-	14 Oct 08 **<FP TBR 3-8>**	[4]	[4]

Notes:

[1] Duration calculations are based on the calendar day difference between events.

[2] The planned launch and docking dates of this flight are specified in SSP 54016.

[3] Flight 16S relocates from DC1 Nadir port to the FGB Nadir port on **<TBD 3-1>**.

[4] This data is outside the Increment Definition and Requirements Document Flight Program time frame.

[5] Space Shuttle launch date are expressed as target dates until the mission-specific Space Shuttle Program Flight Readiness Review, which occurs at Launch minus 2 weeks.

3.3 INCREMENT SUMMARY AND OBJECTIVES

The increment definitions and primary objectives for assembly, system, and utilization operations are provided in Table 3.3-1, Increment 17 Summary. The Multilateral Crew Operations Panel (MCOP) defines crew assignments and respective agencies.

TABLE 3.3-1 INCREMENT 17 SUMMARY

Increment Start	Flight 16S Launch (08 Apr 08) **<FP TBR 3-8>**	
Increment End	Undocking of Flight 16S (23 Oct 08) **<FP TBR 3-8>**	
Increment Duration (days)	198 **<FP TBR 3-8>**	
Crew Plan	E17 CDR Sergei Volkov	16S (launch/return)
	E17 FE-1 Oleg D. Kononenko	16S (launch/return)
	E16/17 FE-2 (1J/A) Garrett E. Reisman	1J/A/1J (launch/return)
	E17 FE-2 (1J) Greg Chamitoff	1J/ULF2 (launch/ return)
	E17/18 FE-2 (ULF2) **<TBD 3-2>**	ULF2/**<TBD 1-1>** (launch/ return) [1]
Crew Days	In Space:	On the ISS:
E17 CDR/FE	198 **<FP TBR 3-8>**	196 **<FP TBR 3-8>**
	Increment 17/Total	Increment 17/Total
E16/17 FE-2 (1J/A)	10/82	8/78
E17 FE-2 (1J)	162/162	158/158
E17/18 FE-2 (ULF2) **<TBD 1-1>**	26/**<TBD 3-3>**	24/**<TBD 3-3>**
Flight 16S Assembly/System Objectives	• Dock 16 Soyuz to the DC1 Nadir port **<FP TBR 3-8>** • Rotate E17 crew with E16 crew (CDR/FE-1) • Perform Visiting Crew Operations • Load and undock 15 Soyuz from the FGB Nadir port	
Flight 16S Utilization Objectives	**NASA: None** **Russian:** Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>** **CSA:** None **ESA:** SAMPLE, CFS-A, ALTCRISS, EuTEF, SOLAR **JAXA:** Cell Wall/Resist Wall	
Stage 16S Assembly/System Objectives	• Perform Flight 1J preparatory tasks	
Stage 16S Utilization Objectives	**NASA:** Conduct On-orbit research program to support: • Nutrition, Repository • Bisphosphonates • Journals, HRF Facility Ops • MISSE 6, SPHERES • LOCAD-PTS, In-SPACE-2 • CFE, EarthKAM, EPO, CEO • ELITE-S2, Sleep Long **Russian:** Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>** **CSA:** None **ESA:** • WAICO#2 • NEUROSPAT, NOA#1, ETD	

	• CFS-A, ALTCRISS • EuTEF, SOLAR **JAXA:** • Cell Wall/Resist Wall
Flight 1J Assembly/System Objectives	• Transfer OBSS to Orbiter • Rotate E16/17 FE-2 (1J/A) with E17 FE-2 (1J) • Berth and install the JPM to Node 2 Port and activate a single power channel • Relocate JEMRMS rack from JLP to JPM • Relocate JEM systems racks from JLP to JPM and activate redundant channel • Perform remaining JLP rack transfers to JPM • Relocate JLP from Node 2 Zenith port to JPM Zenith port • Perform the JPM and JLP checkout • Deploy JEMRMS • Remove and replace S1 NTA.
Flight 1J Utilization Objectives	**NASA:** • Conduct On-orbit research program to support: • Journals, Integrated Immune **<TBD 3-6>**, Midodrine, Sleep Long • MISSE 6 • Perform Operations to support the following SDBIs and Sorties: • Integrated Immune **<TBD 3-6>** • Sleep Short • MAUI • Midodrine • Sleep Long **Russian:** Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>** **CSA:** None **ESA:** • EuTEF and SOLAR • CFS-A, ALTCRISS **JAXA:** None
Stage 1J Assembly/System Objectives	• Relocate 16 Soyuz from the DC1 Nadir port to the FGB Nadir port **<TBD 3-1>** • Dock 29 Progress to the DC1 Nadir port **<FP TBR 3-8>** • Load trash and undock 29 Progress from the DC1 Nadir port **<FP TBR 3-8>** • Dock 30 Progress to the SM Aft port **<FP TBR 3-8>** • Dock 31 Progress to the DC1 Nadir port **<FP TBR 3-8>** • Load trash and undock ATV1 from SM Aft **<FP TBR 3-38> <TBD 3-5>** • Perform Flight ULF2 preparatory tasks • Perform RS EVA #20 to install PDGF Transfer Frame, install foot restraint adapter on Strella, and perform Vsplesk activities. • Unpack and stow cargo delivered on Flight 1J • Perform JPM system checkout • Perform JLP checkout • Perform initial checkout of Japanese payload racks **<TBR 3-1>** • Transfer and install the following racks: EXPR #4, EXPR #5, CHeCS #1, HRF #2, HRF #1, MELFI, and 2 ZSR racks • Perform NASA software transitions: CCS to R7, GN&C to R7, PCS to R11, NCS to R3, S1/P1 to R3, ALSYS to R2, and MSS to 5.1

	• Perform ESA software transition to Cycle 11 • Perform JEMRMS checkout • Perform SPDM checkout • Install FGB enclosures
Stage 1J Utilization Objectives	**NASA:** Conduct On-orbit research program to support: • Journals, Nutrition • Repository, Integrated Immune, Sleep Long • Midodrine Long, MISSE 6 • HRF Facility ops • LOCAD-PTS, SPHERES • ELITE-S2, EarthKAM **Russian:** Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>** **CSA:** None **ESA:** • FASES • 3D Space, NEUROSPAT • ETD, NOA-1, NOA-2, IMMUNO • CFS-A, ALTCRISS • EuTEF, SOLAR • EXPOSE-R **JAXA:** • MEIS, HDTV ops • PADLES installation • EPO demos
Flight ULF2 Assembly/System Objectives	• Rotate E17 FE-2 (1J) with E17/18 FE-2 (ULF2) • Transfer 6-Crew racks and hardware • Transfer FHRC from LMC to ESP3 (move and temporarily stow NTA) • Return NTA from ESP3 to LMC • Relocate P6 PDGF from P6 to FGB • Relocate 2 CETA carts • Perform DTO 848 **<TBD 3-5>** • Install JAXA Proximity GPS antenna on JLP • Install ETVCG on CP7
Flight ULF2 Utilization Objectives	**NASA <TBD 3-8>:** Conduct On-orbit research program to support: • PSSC [DoD payload] • Journals, Integrated Immune, Midodrine • MISSE 6 • Perform operations to support the following SDBIs and Sorties: • Integrated Immune • Sleep Short • MAUI • SEITE **Russian:** Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>** **CSA:** None **ESA <TBD 3-8>:** • EuTEF and SOLAR • CFS-A, ALTCRISS • MUS, MOP • ROALD, PADIAC • EXPOSE-R **JAXA:** None
Stage ULF2 Assembly/System	• Prepare for E17 CDR and E17 FE-1 Departure

Objectives	• Load trash and undock 30 Progress from the SM Aft port **<FP TBR 3-8>** • Perform NASA software transition PVCA to R3
Stage ULF2 Utilization Objectives	**NASA:** Conduct On-orbit research program to support: • Journals, Nutrition • Repository, Integrated Immune, Sleep Long • Midodrine Long, MISSE 6 • HRF Facility ops • LOCAD-PTS, SPHERES • ELITE-S2 **Russian:** Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>** **CSA:** None **ESA:** • IMMUNO, ETD, SAMPLE • EuTEF, SOLAR • CFS-A, ALTCRISS • EXPOSE-R **JAXA:** • Rad Gene, LOH Ice Crystal

NOTE:

[1] Flight **<TBD 1-1>** occurs during Increment 18. Flight **<TBD 1-1>** will be documented in SSP 540*XX*, which takes precedence over this document for Expedition 17/18 FE-2 (ULF2) on-orbit duration.

3.4 DEVIATIONS TO THE GENERIC GROUNDRULES, REQUIREMENTS, AND CONSTRAINTS DOCUMENT

The following deviations to SSP 50261-01 have been identified for Increment 17:

A. SSP 50261-01, Section 4.3.2.8 Hardware redundancy for Extravehicular Activity

"There shall be sufficient hardware available on-orbit (either ISS or Shuttle) to provide the capability to perform all ISS EVAs (assembly, deferred assembly, maintenance or contingency) in the event of any single EVA hardware failure. For United States (U.S.) stage EVAs, there may not be redundant hardware on orbit for the prime ISS EVA crew. In this event, the third ISS crewmember, including the crewmember's suit components, are considered a level of redundancy for ISS prime crew EVA hardware failures."

Rationale for Deviation: **<TBD 3-7>**

Effectivity: Stage 1J

Refer to Risk Mitigation in **<TBD 3-7>**

B. SSP 50261-01, Section 4.3.2.3 Increment Extravehicular Activity Crew Assignment.

"For each Increment, there will be a minimum of two EVA designated Expedition crewmembers for Extravehicular Mobility Unit (EMU) EVAs. To maximize flexibility, the third Expedition crewmember may be designated as an additional EVA crewmember. Expedition crewmembers will not be assigned as EVA crewmembers for Shuttle contingency task (e.g., Payload Bay Door (PLBD) close/latch, Orbiter Docking System Release, etc)."

Rationale for Deviation: **<TBD 3-7>**

Effectivity: Stage ULF2

Refer to Risk Mitigation in **<TBD 3-7>**

Violations to SSP 50261-01 groundrules during Increment 17 if identified, are listed on the Increment 17 Management Team website which can be found at the following Uniform Resource Locator (URL): http://iss-www.jsc.nasa.gov/now/mio/riit/inc_17/web/

4.0 ON-ORBIT RESOURCE ASSUMPTIONS AND ALLOCATIONS

This section defines the allocation of the on-orbit ISS capabilities between systems and utilization across the increment. Allocations are limited to power, crew time, and on-orbit accommodation. Sub-allocations of utilization allocations are provided in the SSP 54017-ANX 5 **<TBD 1-14>**. Any non-standard requirements of resources are also provided in Paragraph 4.5. The allocation guidelines are baselined in the SSP 50261-01. All data contained in this section represent operational requirements.

4.1 POWER BALANCE AND ALLOCATIONS

Table 4.1-1, Power Balance and Allocations, summarizes ISS power capability for each flight/stage in the increment as power is generated by the Electrical Power Systems (EPS) of the USOS and RS for the Flight Attitude Plan specified. The table also shows the integrated systems demands and allocations for the three ISS EPS groups. The USOS power consumption includes the United States elements, the European Columbus elements, the Japanese Experiment Module (JEM) elements, and the Canadian robotics elements. The RS supply and distribution group includes the Russian elements of the ISS.

Power consumptions are representative, and are based on assumed operational modes and the Flight Attitude Plan included in this table. The Flight Attitude Plan represents the attitudes for flights and stages approved by the Program which satisfy the positive energy balance requirement and optimize power availability for Utilization. Post 12A.1 flight, it includes only X-axis into the Velocity Vector (XVV) Local Vertical Local Horizontal (LVLH) attitude. This plan does not contain attitudes used for waste-water dumps, proximity operations, stage Extravehicular Activities (EVAs), etc. Deviations from planned attitudes, and power transfers will be reviewed by the ISS Program, the Operations community, and all affected parties, and will be documented in their respective increment Flight Rules. All calculations in this table represent power availability while the station is in eclipse.

The V symbol in Flight Attitude Plan section of the table refers to the XVV attitude defined as +X axis toward the Velocity Vector with the +Z axis Nadir.

The solar beta angle rates are divided into three categories: low, mid and high. Low Beta range is defined as |_|< 37. Mid Beta range is defined as 37<=|_|<=52. High Beta range is defined as |_|>52.

Table 4.1-1 also shows power transfer in kilowatts (kW) between the power supply and distribution systems of the USOS, and RS for the Flight Attitude Plan specified. A primary purpose of this table is to identify power generation versus systems demand by the USOS, Functional Cargo Block (FGB), and RS and to identify how much power needs to be transferred during different flights and stages. The power transfer allocation values are based on RS and FGB core system power deficits. All values are from the output of the ISS USOS EPS. However, due to inability to limit power transfer via converters to the Russian segment and FGB, numbers are shown in converter

incremental values that reflect the maximum transfer capacity at the converter saturation point.

The RS power margins (allocations to utilization) are a result of USOS power transfers and are calculated as the difference in the total converter increment value transferred at the output of the converters and the core systems deficit for the identified time period. During real time operations the MCC-H may consider cycling the converters to recover power transfer above allocation if needed, and the RS MCC-M will be notified in advance when cycling will be executed. During the pre-mission planning process and real time operations, power transfers will be updated to meet minimum system power requirements as needed. A negative transfer power number represents a transfer in the opposite direction.

The USOS power margin (allocation to utilization) will be managed for allocation to the United States, European, Japanese, and Canadian utilization programs through the Multilateral Payload Control Board (MPCB) and the allocations will be documented in SSP 54017-ANX 5 **<TBD 1-14>**.

TABLE 4.1-1 POWER BALANCE AND ALLOCATIONS (PAGE 1 OF 2)

Flight/ Stage	Power Availability (kW) Total Capability [1]			Power Consumption (kW) Allocation to Systems [2] [5]			Flight Attitude Plan			Power Transfer (kW) Allocation to Systems [2]			Power Margin (kW) Allocation to Utilization [3]		
Increment 17 [12]															
USOS(NASA, JAXA, ESA, CSA)	**L [4]**	**M [4]**	**H [4]**	**L**	**M**	**H**	**L**	**M**	**H**	**L**	**M**	**H**	**L**	**M**	**H**
R Sz 16S [8]	54.0	57.7	50.4	22.7	22.7	22.7	XVV	XVV	XVV	7.4	7.4	9.2	16.7	19.3	13.0
S 16S [8]	54.0	57.7	50.4	22.7	22.7	22.7	XVV	XVV	XVV	5.6	7.4	7.4	18.0	19.3	14.2
F 1J [8], [10]	54.0	54.2	55.1 [11]	35.7	35.7	35.7 [11]	XVV	XVV	XVV	5.6	7.4	7.4 [11]	8.9	7.8	8.4 [11]
S 1J [8]	54.0	57.7	50.4	26.0	26.0	26.0	XVV	XVV	XVV	5.6	7.4	7.4	15.7	17.0	11.9
S 1J [9]	54.0	57.7	50.4	26.0	26.0	26.0	XVV	XVV	XVV	7.4	7.4	7.4	14.4	17.0	11.9
F ULF2 [9], [10]	52.8	53.0	54.0 [11]	36.1	36.1	36.1 [11]	XVV	XVV	XVV	7.4	7.4	7.4 [11]	6.5	6.6	7.4 [11]
S ULF2 [9]	52.9	56.4	49.6	26.0	26.0	26.0	XVV	XVV	XVV	7.4	7.4	7.4	13.6	16.1	11.4
R Sz 17S [8]	52.9	56.4	49.6	26.0	26.0	26.0	XVV	XVV	XVV	7.4	7.4	9.2	13.6	16.1	10.1
FGB [6]	**L [4]**	**M [4]**	**H [4]**	**L**	**M**	**H**	**L**	**M**	**H**	**L**	**M**	**H**	**L**	**M**	**H**
R Sz 16S [8]	0.0	0.0	0.0	1.6	1.6	1.6	XVV	XVV	XVV	-2.0	-2.0	-2.0	0.1	0.1	0.1
S 16S [8]	0.0	0.0	0.0	1.6	1.6	1.6	XVV	XVV	XVV	-2.0	-2.0	-2.0	0.1	0.1	0.1
F 1J [8], [10]	0.0	0.0	0.0 [11]	1.6	1.6	1.6 [11]	XVV	XVV	XVV	-2.0	-2.0	-2.0 [11]	0.1	0.1	0.1 [11]
S 1J [8]	0.0	0.0	0.0	1.6	1.6	1.6	XVV	XVV	XVV	-2.0	-2.0	-2.0	0.1	0.1	0.1
S 1J [9]	0.0	0.0	0.0	1.6	1.6	1.6	XVV	XVV	XVV	-2.0	-2.0	-2.0	0.1	0.1	0.1
F ULF2 [9], [10]	0.0	0.0	0.0 [11]	1.6	1.6	1.6 [11]	XVV	XVV	XVV	-2.0	-2.0	-2.0 [11]	0.1	0.1	0.1 [11]
S ULF2 [9]	0.0	0.0	0.0	1.6	1.6	1.6	XVV	XVV	XVV	-2.0	-2.0	-2.0	0.1	0.1	0.1
R Sz 17S [8]	0.0	0.0	0.0	1.6	1.6	1.6	XVV	XVV	XVV	-2.0	-2.0	-2.0	0.1	0.1	0.1

TABLE 4.1-1 POWER BALANCE AND ALLOCATIONS (PAGE 2 OF 2)

Flight/ Stage	Power Availability (kW) Total Capability [1]			Power Consumption (kW) Allocation to Systems [2] [5]			Flight Attitude Plan			Power Transfer (kW) Allocation to Systems [2]			Power Margin (kW) Allocation to Utilization [3]		
Increment 17 [12]															
RS [7]	**L [4]**	**M [4]**	**H [4]**	**L**	**M**	**H**	**L**	**M**	**H**	**L**	**M**	**H**	**L**	**M**	**H**
R Sz 16S [8]	2.1	1.7	0.7	6.1	6.1	6.1	XVV	XVV	XVV	-5.4	-5.4	-7.2	0.5	0.1	0.6
S 16S [8]	2.1	1.7	0.7	4.8	4.8	4.8	XVV	XVV	XVV	-3.6	-5.4	-5.4	0.3	1.4	0.4
F 1J [8], [10]	2.1	1.7	0.7 [11]	4.8	4.8	4.8 [11]	XVV	XVV	XVV	-3.6	-5.4	-5.4 [11]	0.3	1.4	0.4 [11]
S 1J [8]	2.1	1.7	0.7	4.8	4.8	4.8	XVV	XVV	XVV	-3.6	-5.4	-5.4	0.3	1.4	0.4
S 1J [9]	2.1	1.7	0.7	5.1	5.1	5.1	XVV	XVV	XVV	-5.4	-5.4	-5.4	1.5	1.1	0.1
F ULF2 [9], [10]	2.1	1.7	0.7 [11]	5.1	5.1	5.1 [11]	XVV	XVV	XVV	-5.4	-5.4	-5.4 [11]	1.5	1.1	0.1 [11]
S ULF2 [9]	2.1	1.7	0.7	5.1	5.1	5.1	XVV	XVV	XVV	-5.4	-5.4	-5.4	1.5	1.1	0.1
R Sz 17S [8]	2.1	1.7	0.7	6.1	6.1	6.1	XVV	XVV	XVV	-5.4	-5.4	-7.2	0.5	0.1	0.6

NOTES:

[1] Power Availability limited by rules governing BCDU power output. (limits each channel to 10.5 kW), and the drag reduction plan (bias up to 44 deg)

[2] Includes power required for assembly and system tasks

[3] Utilization Allocations to each IP based on USOS: 100 percent of USOS power, Roscosmos: 100 percent of RS power

[4] Low Beta is defined as ≤ 37 degrees, Mid Beta is defined between 37 and 52 degrees, High Beta is defined as >52 degrees

[5] USOS *Power Consumption* includes the following assumptions for Columbus and JEM system loads @ low ß:

(ESA elements, 2729 watts, JAXA elements R Sz 16S and S 16S – 475 watts, F 1J and subs – 3871 watts)

[6] FGB Loads and Power Generation values provided by Khrunichev.

[7] RS Loads and Power Generation values provided by Energia (SM arrays in sun tracking mode)

[8] 1 Progress attached to RS

[9] 2 Progress attached to RS

[10] SSPTS load @ 9.6kW

[11] Shuttle mated flight ops are constrained to solar beta angles of less than 60 degrees.

[12] Power analysis does not include ATV1 loads. **<TBD 4-5>**

Legend					
L	Low beta angle range	LTA	Launch To Activation	R Sz	Soyuz rotation
M	Mid beta angle range	F	Flight	V	XVV flight attitude
H	High beta angle range	S	Stage	P	XPOP flight attitude

4.2 CREW TIME

Table 4.2-1, Crew Time Allocations, shows the integrated ISS crew time availability, systems demand, and utilization allocation. The ISS utilization allocation will be managed for allocation to the United States, Russian, European, Japanese, and Canadian utilization programs through the Multilateral Payload Control Board (MPCB). The International Partner utilization crew time allocations will be documented in SSP 54017-ANX 5 **<TBD 1-14>**.

TABLE 4.2-1 CREW TIME ALLOCATIONS

Crew Time (hours)	Total
Total Capability [1]	2094.00
Systems Requirements [2] [5] [6]	1920.9
Total Allocation to Utilization [3] [5] [6]	190.10
Utilization Requirements	**[4] <TBD 4-2>**
Margin (+/-)	**[4] <TBD 4-2>**

NOTES:

[1] Includes only ISS-17 crew duty time available during Independent Operations to perform assembly, system, and utilization activities. Includes one hour per crewmember per Saturday or Sunday.

[2] In addition to the crew time allocations for stage operations (assembly and systems tasks including Vehicle Traffic, Assembly/Outfitting, Maintenance, EVA, Routine Operations, Medical, OBT and PAO), additional NASA and Roscosmos systems activities are scheduled during Soyuz and Shuttle docked timeframes per the GGR&C.

[3] Includes ISS-17 crewmember time allocated during Joint Soyuz and Shuttle missions. Refer to section 6 for average weekly crew time allocations.

[4] USOS Utilization Requirement is 123 hours; RSOS Requirement is not yet defined.

[5] JAXA requires crew time for JEM checkout tasks performed by ISS crew as follows: Stage 1J : 85.5 H

[6] The Systems Requirements crew time will decrease by approximately 90 hrs after the Russian Flight Program revisions are incorporated to remove 31P requirements from Increment 17. The available Utilization crew time will then be updated as well. **<TBR 4-1>**

[7] The Systems Requirements crew time includes an estimate for JEM Activation & Check-out and Rack Relocation activities that are still under development. These numbers will be updated as more definite data is available. **<TBR 4-2>**

4.3 ACCOMMODATIONS

Table 4.3-1, On-Orbit Accommodation Allocations (Pressurized), shows the pressurized on-orbit accommodation allocations for the increment and when the on-orbit internal configuration changes. The unit of measure is Rack Volume Equivalents (RVEs). Russian accommodations are not shown since they are not allocated to the other Partners.

TABLE 4.3-1 ON-ORBIT ACCOMMODATION ALLOCATIONS (PRESSURIZED)
(PAGE 1 OF 2)

Rack Volume Equivalents [1]	ISS-17		
	16S – 1J	1J – ULF2	ULF2 – 17S
Total Capability (RVE)	75.7	98.7	98.7
Node 1	4	4	4
Node 2	8	8	8
U.S. Lab	24	24	24
Airlock	4	4	4
Columbus	16	16	16
FGB	11.7	11.7	11.7
JLP	8	8	8
JPM	N/A	23	23
NASA Allocation to System/Stowage			
Node 1	4	4	4
Node 2	8	8	8
U.S. Lab [2]	13	13	13
Airlock	4	4	4
Columbus	3	3	3
FGB	10.9	10.9	10.9
JLP	0	2.5	2.5
JPM	N/A	0	0
NASA Allocation to NASA Utilization			
Node 1	0	0	0
Node 2	0	0	0
U.S. Lab [3]	10+3	10+3	10+3
Airlock	0	0	0
Columbus	5	5	5
FGB	0	0	0
JLP	0	1.5	1.5
JPM	N/A	5.85 [6]	5.85 [6]
Total			
Amount subscribed [3]	9+3	9+3	9+3
Remaining available [5]	7.5	11.85 [6]	11.85 [6]

TABLE 4.3-1 ON-ORBIT ACCOMMODATION ALLOCATIONS (PRESSURIZED) (PAGE 2 OF 2)

Rack Volume Equivalents [1]	ISS-17		
	16S – 1J	1J – ULF2	ULF2 – 17S
Roscosmos Allocation			
FGB System/Stowage [4]	.8	.8	.8
FGB Utilization	0	0	0
ESA Allocation			
Columbus System/Stowage	3	3	3
Columbus Utilization	5	5	5
JAXA Allocation			
JLP System/Stowage	6	2.5	2.5
JLP Utilization	2	1.5	1.5
JPM System/Stowage	N/A	11	11
JPM Utilization	N/A	6.15[6]	6.15[6]

NOTES:

[1] RVEs can be equated to rack locations in the Node 1, Node 2, U.S. Lab, Columbus, JLP, JPM and Airlock.

(a) Before installation of new enclosures, the FGB has 11.9 m3 of stowage volume, which is approximately 11.7 RVEs.

(b) After installation of new enclosures is complete, the FGB will have 13.2 m3 of stowage volume, which is approximately 12.9 RVEs.

[2] During Increment 17, System will use two of the rack locations in the U.S. Lab allocated to Utilization for pre-positioning of system racks TeSS and OGS.

[3] Utilization items belonging to the utilization passive stowage RVE allocation might not be physically stowed in the U.S. Lab.

[4] Includes 0.8 m^3 for stowage provided by FGB enclosures per January 2003 protocol (Ref. OC-03-003).

[5] One unsubscribed RVE is positioned in front of LAB window.

[6] Five ISPRs each for NASA and JAXA in JPM plus MELFI. MELFI volume split 0.85 NASA / 0.15 JAXA. JAXA has one stowage rack for utilization in JPM.

4.4 <RESERVED>

4.5 ADDITIONAL RESOURCE REQUIREMENT

Table 4.5-1, Additional Resource Requirement, provides the tactical agreements on using non-standard requirements of on-orbit resources (i.e. consumables: water, Oxygen (O_2), Nitrogen (N_2), propellant, etc.) that are not specified in Paragraphs 4.1 - 4.4, but whose consumption can result in errors of important on-board consumables management if not tracked and recorded.

Table 4.5-1 provides the total amount of a resource needed for a specific increment or stage. When the resource is used on-orbit, the resource may be recovered back into resource or emitted in the ISS environment. If the requirement has a closed-loop system, then, the percentage recovered and emitted is not applicable. The utilization allocations will be documented in SSP 54017-ANX 5 **<TBD 1-14>**.

TABLE 4.5-1 ADDITIONAL RESOURCE REQUIREMENT

USER [1]	Resource	Total Amount of Usage
Increment 17		
NASA (EMCS)	N2	**<TBD 4-4>**
(Biolab)	GN2	**<TBD 4-4>**
(WAICO)	GN2	**<TBD 4-4>**

[1] User is defined as the IP needing the resource usage.

5.0 ASCENT/DESCENT CARGO ALLOCATIONS AND MANIFEST SUMMARY

Table 5.0-1, Ascent/Descent Allocations and Manifest Summary, contains the cargo delivery and return allocations, and the manifest summary for each flight in the increment. The table includes major cargo to the rack or Orbital Replacement Unit (ORU) level. This table controls program-level allocations. Detailed ISS manifest items are documented in the appropriate SSP 54017-*XX*. The cargo allocations are for the Partner that provides the transportation vehicle unless stated otherwise.

The allocations are based on the Consolidated Operations and Utilization Plan and then refined based on current capability and ISS requirements. Volume data shown is for pressurized stowage areas only and is listed as rack equivalents for full racks in the Multi-Purpose Logistics Module (MPLM), Middeck Locker Equivalents (MLEs) for stowage on the middeck, and Cargo Transfer Bag Equivalents (CTBEs) for passive stowage in the MPLM and SpaceHab, and RVEs for ATV. Progress and Soyuz data are described in terms of volume (in cubic meters (m^3)) and mass (in kilograms (kgs) and pounds (lbs)). The maintenance allocation includes pre-positioned spares and planned maintenance equipment. It does not include items that are considered urgent need spares. Water transfer listed under allocations represents the transfer target for Shuttle water generated on-orbit that is transferred to the ISS. Water transfer listed under International Partner vehicles is water transported up in the International Partner vehicle.

All allocations need to include packing factor and trash. Each owner is responsible for including packing factor and trash.

Soyuz Transportation Modified Anthropometric (TMA) vehicles provide transportation for the Soyuz crew, Expedition crew rotation and will provide the capability for ISS crew rescue return (up to three). The Soyuz TMA has minimal capability to deliver cargo.

TABLE 5.0-1 ASCENT/DESCENT ALLOCATIONS AND MANIFEST SUMMARY

Flight	Manifest Item Category	Mass (kg/lb)	Volume
16S	**ASCENT**		
	Manifest Summary		
	Soyuz-TMA		
	Allocations		
	Dry Cargo		
	Roscosmos	**<TBD 5-1>**	**<TBD 5-1>**
	Candidates	**<TBD 5-1>**	**<TBD 5-1>**
	Total	**<TBD 5-1>**	**<TBD 5-1>**
	Total with Candidates	**<TBD 5-1>**	**<TBD 5-1>**
15S	**DESCENT**		
	Manifest Summary		
	Soyuz-TMA		
	Allocations		
	Dry Cargo		
	Roscosmos	**<TBD 5-1>**	**<TBD 5-1>**
	Utilization		
	NASA: Integrated Immune Samples	0.23	0.001m^3
	Candidates	**<TBD 5-1>**	**<TBD 5-1>**
	Total	**<TBD 5-1>**	**<TBD 5-1>**
	Total with Candidates	**<TBD 5-1>**	**<TBD 5-1>**
1J	**ASCENT**		
	Manifest Summary		
	JEM PM: 4 Systems Racks: JEM-DMS2, JEM ECLSS/TCS-1, JEM-ECLSS/TCS-2, JEM-ESP2		
	JEMRMS		
	Middeck ISS content, Shuttle Integration H/W		
	Allocations		
	Russian	0	0 CTBE
	JAXA	80/175	5 MLE
	Maintenance		0 CTBE
	- Middeck	0	0 CTBE
	Crew Provisions		
	- Middeck	**<TBD 5-2>**	**<TBD 5-2>**
	Utilization		
	- Middeck	8.2	0.02 m^3
	STS O_2 for EVA prebreathe	3.6/8	
	O_2 transfer to ISS A/L HPGTs (as consumables allow)	25/55	
	N_2 transfer to ISS A/L HPGTs	0	
	(Water transfer to ISS)	371/816.2	371 liters
	7 CWCs (5 Technical, 2 Potable)		
	7 PWRs (4 EMU, 3 OGS)		
	DESCENT		

	Manifest Summary		
	Middeck ISS content, Shuttle Integration H/W		
	Allocations		
	Russian	0	0 CTBE
	ESA	**<TBD 5-2>**	**<TBD 5-2>**
	JAXA	**<TBD 5-2>**	**<TBD 5-2>**
	Maintenance		
	- Middeck	**<TBD 5-2>**	**<TBD 5-2>**
	Crew Provisions		
	- Middeck	**<TBD 5-2>**	**<TBD 5-2>**
	Utilization		
	- Middeck	110.9	5.4 MLE
29P	**ASCENT**		
	Progress-M1		
	Propellant	**<TBD 5-1>**	**<TBD 5-1>**
	Gas	**<TBD 5-1>**	**<TBD 5-1>**
	Water	**<TBD 5-1>**	**<TBD 5-1>**
	Dry Cargo		
	Roscosmos	**<TBD 5-1>**	**<TBD 5-1>**
	Utilization	**<TBD 5-1>**	**<TBD 5-1>**
ATV1	**DESCENT**		
	Nonrecoverable	**<TBD 5-1>**	**<TBD 5-1>**
29P	**DESCENT**		
	Nonrecoverable	**<TBD 5-1>**	**<TBD 5-1>**
30P	**ASCENT**		
	Progress-M1		
	Propellant	**<TBD 5-1>**	**<TBD 5-1>**
	Gas	**<TBD 5-1>**	**<TBD 5-1>**
	Water	**<TBD 5-1>**	**<TBD 5-1>**
	Dry Cargo		
	Roscosmos	**<TBD 5-1>**	**<TBD 5-1>**
	Utilization	**<TBD 5-1>**	**<TBD 5-1>**
31P	**ASCENT**		
	Progress-M1		
	Propellant	**<TBD 5-1>**	**<TBD 5-1>**
	Gas	**<TBD 5-1>**	**<TBD 5-1>**
	Water	**<TBD 5-1>**	**<TBD 5-1>**
	Dry Cargo		
	Roscosmos	**<TBD 5-1>**	**<TBD 5-1>**
	Utilization	**<TBD 5-1>**	**<TBD 5-1>**
ULF2	**ASCENT**		
	Manifest Summary		
	Middeck ISS content, Shuttle Integration H/W		
	Allocations		
	- Middeck		

	ISS Unique	54.43/120	
	ISS EMU	90.71/200	
	ISS EVA Tools	45.36/100	
	Joint IPT Reserve	113.40/250	
	Utilization		
	- Middeck	90.2	2.9 MLE
	- MPLM	1645.0	43.4 CTBE
	- Cargo Bay	57.2	**<TBD 5-1>**
	STS O_2 for EVA prebreathe	**<TBD 5-1>**	**<TBD 5-1>**
	O_2 transfer to ISS A/L HPGTs	0	
	N_2 transfer to ISS A/L HPGTs	0	
	(Water transfer to ISS)	473/1043	473 liters
	DESCENT		
	Manifest Summary		
	Middeck ISS content, Shuttle Integration H/W		
	Allocations		
	- Middeck		
	ISS Unique	54.43/120	
	ISS EMU	90.71/200	
	ISS EVA Tools	45.36/100	
	Joint IPT Reserve	113.40/250	
	Utilization		
	- Middeck	119.3	4.4 MLE
	- MPLM	169.7	6.4 CTBE
	- Cargo Bay	49.9	**<TBD 5-1>**
30P	**DESCENT**		
	Nonrecoverable	**<TBD 5-1>**	**<TBD 5-1>**

NOTES:

[1] 1 RVE - 19 CTBE.

Table 5.0-1A, Ascent/On-Orbit/Descent Power Allocation for Utilization (Watts), contains power availability for each flight in the increment.

TABLE 5.0-1A ASCENT/ON-ORBIT/DESCENT POWER ALLOCATION FOR UTILIZATION (WATTS)

Flight	Ascent	On-Orbit	Descent
1J	0	0	0
ULF2	300	300	300

6.0 REQUIREMENTS

This section defines all of the unique programmatic requirements for the increment's flight and stage intervals necessary to ensure successful completion of planned assembly, maintenance, operations, and utilization of the ISS during the increment. Generic requirements and constraints are documented in SSP 50261-01.

The section 6 stage and flight sections also include generic groupings of tasks in paragraph 6.x.2 and contingency tasks in paragraph 6.x.4. These generic groupings of tasks include the integrated Roscosmos, NASA, Canadian Space Agency (CSA), European Space Agency (ESA), and JAXA requirements that are to be performed within the assigned allocation of crew time (in terms of average weekly crew hours). Crew times are not usually assigned to contingency tasks. The groups include maintenance, medical, payload (utilization), Onboard Training (OBT), and Public Affairs Office (PAO) task requirements. The integrated Roscosmos, NASA, CSA, ESA, and JAXA requirements are managed within the identified ISS Program documentation. Each group may also be distributed into high, medium, and low (or remaining) priorities.

6.1 <RESERVED>

6.2 INCREMENT 17 SPECIFIC REQUIREMENTS

This paragraph identifies requirements applicable during Increment 17. Detailed multilateral requirements and agreements for Payloads/Utilization are specified in SSP 54017-ANX 5 **<TBD 1-14>**.

6.2.1 RUSSIAN UTILIZATION EXPERIMENTS

Russian science experiments to be conducted during Increment 17 shall consist of the following:

<TBD 6-1>

6.2.2 VISITING CREW UTILIZATION EXPERIMENTS

Visiting crew utilization experiments to be performed for Increment 17 shall consist of the following:

<TBD 6-1>

6.3 FLIGHT 16S REQUIREMENTS

This paragraph identifies ISS requirements during Flight 16 Soyuz Transportation Modified Anthropometric (TMA).

6.3.1 <RESERVED>

6.3.2 FLIGHT 16S TASKS (IN DESCENDING PRIORITIZED ORDER)

These tasks, listed in order of ISS Program priority, are to be executed during this flight. The order of execution for these tasks in the nominal plan may vary, depending on timeline efficiencies. The Flight 16S Task Priorities have been prepared so that, in the event of a shortened mission, task execution order can be modified such that all mandatory tasks will be completed. The following numbered tasks shall be accomplished for successful completion of this flight.

1. Dock Flight 16 Soyuz TMA to Docking Compartment (DC)1 Nadir port and perform mandatory crew safety briefing for all crew members. **[Intravehicular Activity (IVA)] [Imagery]**
2. Rotate Expedition 16 Commander (CDR) and Flight Engineer (FE)-1 crewmembers with Expedition 17 CDR and FE-1 crewmembers, transfer mandatory crew rotation cargo, perform mandatory tasks including Sokol suit checkout. Transfer and install the Visiting Crew's (VC) and FE-2's seat liner in the appropriate Soyuz as required. **[IVA]**
3. Perform minimum crew handover of 12 hours per rotating crewmember, which includes crew safety handover. **[IVA] [Robotics]**
4. Transfer and stow critical items. **[IVA]**
5. Undock 15 Soyuz-TMA from Functional Cargo Block (FGB) Nadir port. **[IVA] [Imagery]**
6. Perform ISS high priority maintenance activities. **[IVA]**
7. Perform high priority medical operations (average of 10 crew hours per week). **[IVA] [Imagery]**
8. Conduct visiting crew operations. **[IVA] [Imagery]**

   The following activities are 16 Soyuz visiting crew activities (not listed in priority order). All operations are to be conducted using only Russian Segment (RS) resources unless specified otherwise in Appendix K. **<TBD 6-2> <TBD K-1>**

   A. Conduct photo/video imagery.

   B. Conduct VC Utilization activities.

   C. Conduct RS public affairs activities and commemorative activities.

D. Conduct transfer activities.

1) Soyuz unloading.

2) Equipment return.

E. Conduct Communications.

1) Russian Mission Control Center (Soyuz and ISS).

2) Sessions using the Sputnik-SM ham radio.

F. Conduct Soyuz systems maintenance.

G. Conduct Soyuz handover.

H. Conduct RS crew life support activities onboard the ISS.

9. Perform ISS payload research operations tasks. **[IVA]**

- ESA: SAMPLE, Solar variability and irradiance monitor (SOLAR), European Technology Exposure Facility (EuTEF), ALTCRISS, CFS-A

10. Perform ISS daily ISS payload status checks as required. **[IVA]**

11. Perform additional 4 hours per rotating crewmember of ISS crew handover (16 hours per crewmember total). **[IVA]**

12. Transfer remaining items from 16S TMA to ISS. **[IVA]**

13. Perform Station Development Test Objective (SDTO) 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 15S undocking from FGB Nadir port [ISS Wireless Instrumentation System (IWIS) required]. **[IVA] [Ground]**

14. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 16S docking to DC1 Nadir port (IWIS required). **[IVA] [Ground]**

6.3.3 ISS/VEHICLE ORBITAL AND CONFIGURATION REQUIREMENTS

6.3.3.1 Flight 16 Soyuz-TMA shall dock at the DC1 Nadir port.

6.3.3.2 Flight 15 Soyuz-TMS shall undock from the FGB Nadir port.

6.3.3.3 The ISS shall be in Control Moment Gyroscope (CMG) control with all thrusters inhibited for the following activities:

None identified.

6.3.3.4 The ISS shall be in a free drift configuration with the CMGs not controlling and with all thrusters inhibited for the following activities:

None identified.

6.3.4 CONTINGENCY REQUIREMENTS

6.3.4.1 Mission Control Center - Houston (MCC-H) and Mission Control Center - Moscow (MCC-M) shall build procedures, contingency timelines, and conduct training for the following non-EVA tasks. (The items listed below are for unique tasks or first implementation of new tasks. For contingency tasks not listed below, products/planning are already in place from previous flights/stages, or the ISS Program has determined that resources will not be applied to develop products/planning until the contingency is invoked.):

- ISS critical maintenance tasks as follows:

  None identified.

6.3.5 JETTISON REQUIREMENTS

Planning and product development, including safety data packages, will be performed to support jettison of the following items during EVA. This will include trajectory analysis to ensure acceptable low risk of recontact with ISS and of damage or injury following re-entry, procedures and training for the crew including worksite identification and desired jettison direction and velocity, and related hazard assessments, including joint safety review in accordance with SSP 50146.

6.3.5.1 Planned Jettison

The following items are planned for jettison during EVA in this flight:

A. U.S.: None identified.

B. Russian: None identified.

6.3.5.2 Contingency Jettison

The following items may require jettison if they cannot be configured safely to allow vehicle dockings or maneuvers or if their continued operation poses a hazard to the EVA crew.

A. U.S.: None identified.

B. Russian: None identified.

6.3.6 GROUND SYSTEMS REQUIREMENTS

A. Ground Support is required to operate Structural Dynamic Measurement System (SDMS), IWIS and External Wireless Instrumentation System (EWIS) for SDTO: 13004-U.

B. Ground support is highly desired to operate Station Acceleration Measurement System - II (SAMS-II), Microgravity Acceleration Measurement System (MAMS) and Russian ALO (Optical Linear Accelerometers) sensors for SDTO: 13004-U. SAMS and MAMS availability will be assessed real time.

6.4 FLIGHT 15S UNDOCK TO FLIGHT 1J DOCK REQUIREMENTS (STAGE 16S)

This paragraph identifies ISS requirements applicable from Flight 15 Soyuz undock to Flight 1J dock.

6.4.1 <RESERVED>

6.4.2 STAGE 16S TASKS (IN DESCENDING PRIORITIZED ORDER)

These tasks, listed in order of ISS Program priority, are to be executed during this stage. The order of execution for these tasks in the nominal plan may vary depending on timeline efficiencies. The following numbered tasks, which include no Station-based Extravehicular Activities (EVAs), shall be accomplished for successful completion of this interval.

1. Perform high priority ISS maintenance and Shuttle Launch Commit Criteria for the next Shuttle Flight. **[IVA] [Imagery]**
2. Perform ISS medical operations (average of 10 crew hours per week for crew of 3). **[IVA]**
3. Perform checkout and preparation tasks for Flight 1J. **<TBD 6-3> [IVA]**
   A. Position Mobile Transporter (MT) at Work Site (WS) #4 for Flight 1J joint operations (if not completed in Increment 16). **[Robotics] [Ground]**
   B. Perform Space Station Remote Manipulator System (SSRMS) pre-launch checkout at Power Data Grapple Fixture (PDGF) 3 of the MT positioned on WS #4 (if not completed in Increment 16). **[Robotics] [Ground]**
   C. Unstow and configure Joint Airlock (if not completed in Increment 16).
   D. Complete Flight 1J pre-pack (if not completed in Increment 16).
   E. Configure and check out EVA equipment (if not completed in Increment 16).
   F. Perform training and preparation for joint operations.
   G. Complete Flight plan and EVA timeline reviews.
   H. Perform tool preparation (if not completed in Increment 16).
   I. Perform transfer tag-up.
4. Perform imagery of Orbiter Thermal Protection System (TPS) during rendezvous R-bar Pitchover Maneuver (RPM) and downlink the data. **[IVA] [Imagery]**
   - Perform proficiency training for imagery of Orbiter during RPM.
5. Perform high-priority OBT (average of 4 **<TBD 6-4>** crew hours per week) substituting planned SSRMS/Special Purpose Dexterous Manipulator (SPDM) tasks as OBT when appropriate. **[IVA] [Robotics]**

6. Perform Expedition 17 crew Station Support Computer (SSC) software reloads. **[IVA]**

7. Perform high priority ISS payload operations (average of **<TBD 6-4>** crew hours per week). **[IVA]**

   A. NASA: Nutrition, Repository, Bisphosphonates, Journals, Materials International Space Station Experiment (MISSE) 6, Synchronized Position Hold Engage Reorient Experimental Satellites (SPHERES), Lab-On-a-Chip Applications Development - Portable Test System (LOCAD-PTS), Human Research Facility (HRF) Facility Operations

   B. Russian: Reference IDRD Paragraph 6.2.1 and SSP 54017-ANX 5 **<TBD 1-14>**

   C. CSA: None

   D. ESA: Wild Type Arabidopsis Roots Grown in Space (WAICO)#2, NEUROSPAT, NOA#1, ALTCRISS, ETD, Colored Fungi in Space (CFS-A), European Technology Exposure Facility (EuTEF), SOLAR

   E. JAXA: Cell Wall/Resist Wall

8. Perform high priority PAO events (average of **<TBD 6-4>** crew hours per week). **[IVA] [Imagery]**

9. Perform medium priority ISS maintenance. **[IVA] [Imagery]**

10. Perform medium priority ISS payload operations (average of **<TBD 6-4>** crew hours per week). **[IVA]**

11. Perform low priority OBT substituting planned SSRMS/SPDM tasks as OBT when appropriate. **[IVA] [Robotics]**

12. Perform remaining ISS PAO activities. **[IVA] [Imagery]**

13. Perform remaining maintenance. **[IVA]**

14. Perform remaining ISS payload operations. **[IVA]**

15. Perform SSRMS/Mobile Remote Servicer (MRS) Base System (MBS) On-orbit Checkout Requirements (OCRs) per the priorities in Appendix H **<TBD H-1>**. **[IVA] [Robotics] [Imagery] [Ground]**

16. Reboost ISS with ATV1 thrusters as required. **[Ground]**

17. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, for ISS alone reboost (IWIS required). **[IVA] [Imagery] [Ground]**

6.4.3 ISS/VEHICLE ORBITAL AND CONFIGURATION REQUIREMENTS

6.4.3.1 The ISS shall be in CMG control without ISS thrusters firing for the following activities:

None identified.

6.4.3.2 The ISS shall be in free drift configuration with the CMGs not controlling and without ISS thrusters firing for the following activities:

None identified.

6.4.4 CONTINGENCY REQUIREMENTS

6.4.4.1 MCC-H and MCC-M shall build procedures, contingency timelines, and conduct training to allow the crew to perform the following non-EVA tasks. The items listed below are for unique tasks or first implementation of new tasks. For contingency tasks not listed below, products/planning are already in place from previous flights/stages, or the ISS Program has determined that resources will not be applied to develop products/planning until the contingency is invoked:

A. ISS critical maintenance tasks as follows:

   None identified.

B. Complete critical unfinished Flight 1J/A assembly tasks as follows:

   None identified.

C. Remove/replace critical spares as follows:

   None identified.

6.4.4.2 MCC-H and MCC-M shall build task specific procedures, contingency timelines, and conduct training to a high level sufficient to meet the following objectives:

- Identify task specific technical and safety issues.
- Identify on-board equipment required to perform the task.
- Determine the scope of effort required to prepare for the specific configurations, locations, and environmental conditions for the EVA.
- Provide the crew with the proper skill set required to perform the tasks given the on-board proficiency training assets available.

The readiness of these tasks will be based upon the generic development of the task procedures and timelines to a level that can be validated against a set of criteria defined in Generic Groundrules, Requirements, and Constraints (GGR&C) 3.9.1, “Process for EVA Readiness”. For contingency tasks not listed below, the ISS Program has

determined that until the contingency is invoked, resources will not be applied to develop products or plans and the feasibility to perform those tasks on this flight/increment will be undetermined.

A. ISS critical maintenance tasks as follows. This list is not in order of priority. The criteria for tasks being added to this list are that the failure of the function provided by the ORU causes a situation placing the ISS in a configuration that is zero tolerant, or effectively zero fault tolerant, to survival.

   1. Maintain ISS Primary EPS Survivability

      a. External (EXT) Multiplex/Demultiplexer (MDM) Remove and Replace (R&R)

      b. Battery Charge/Discharge Unit (BCDU) Backout

      c. Main Bus Switching Unit (MBSU) R&R

      d. Sequential Shunt Unit (SSU) R&R

      e. Direct Current Switching Unit (DCSU) R&R

      f. R&R of Direct Current-to-Direct Current Converter Units (DDCUs) 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, S01A, S02B

      g. Solar Array Wing (SAW) Manual Positioning

      h. Pump Flow Control Subassembly (PFCS) R&R

      i. Photovoltaic Controller Unit (PVCU) MDM R&R

      j. R&R of External Remote Power Control Modules (RPCMs) S01A_C, S02B_C, S01A_A, S11A_D, S02B_A, and P12B_D

   2. Maintain ISS Thermal Control System (TCS) Survivability

      a. Interface Heat Exchanger (IFHX) R&R

      b. External Thermal Control System (ETCS) Pump Module R&R

      c. Flex Hose Rotary Coupler (FHRC) R&R

      d. Ammonia (NH3) Leak Isolation and Recovery **<To Be Resolved (TBR) 6-1>**

B. Complete critical unfinished Flight 1J/A or Flight 16 Soyuz assembly tasks as follows:

   None identified.

C. Remove/replace critical spares as follows:

   None identified.

D. Contingency MT safing requirement:

- Contingency EVA power cable routing for stranded MT. (For Increment 17, this requirement will be met with already accomplished skills based training and additional OBT if the contingency is invoked.)

6.4.5 JETTISON REQUIREMENTS

Planning and product development, including safety data packages, will be performed to support jettison of the following items during EVA. This will include trajectory analysis to ensure acceptable low risk of recontact with ISS and of damage or injury following re-entry, procedures and training for the crew including worksite identification and desired jettison direction and velocity, and related hazard assessments, including joint safety review in accordance with SSP 50146.

6.4.5.1 Planned Jettison

The following items are planned for jettison during EVA in this stage:

A. U.S.: None identified.

B. Russian: None identified.

6.4.5.2 Contingency Jettison

The following items may require jettison if they cannot be configured safely to allow vehicle dockings or maneuvers or if their continued operation poses a hazard to the EVA crew.

A. U.S.: None identified.

B. Russian: None identified.

6.4.6 GROUND SYSTEMS REQUIREMENTS

A. Ground Support is required to operate Structural Dynamic Measurement System (SDMS), IWIS and External Wireless Instrumentation System (EWIS) for SDTO: 13005-U.

B. Ground support is highly desired to operate Station Acceleration Measurement System - II (SAMS-II), MAMS and Russian ALO (Optical Linear Accelerometers) sensors for SDTO: 13005-U. SAMS and MAMS availability will be assessed real time.

C. Ground Systems are required for MT positioning.

D. Ground Systems are required for SSRMS pre-launch check out.

E. Ground Systems are required for MBS check out.

6.5 FLIGHT 1J REQUIREMENTS

This paragraph identifies ISS requirements during Flight 1J. Detailed requirements and agreements between the ISS Program and the Space Shuttle Program are specified in National Space Transportation System (NSTS) 21370, International Space Station Mission (1J) Integration Plan.

6.5.1 <RESERVED>

6.5.2 FLIGHT 1J TASKS (IN DESCENDING PRIORITIZED ORDER)

These tasks, listed in order of ISS Program priority, are to be executed during this flight. The order of execution for these tasks in the nominal plan may vary, depending on timeline efficiencies. The Flight 1J Task Priorities have been prepared so that, in the event of a shortened mission, task execution order can be modified such that all mandatory tasks will be completed. The following numbered tasks, which include three Station-based EVAs to be performed by the Orbiter crew, shall be accomplished for successful completion of this flight:

1. Dock Flight 1J to Pressurized Mating Adapter (PMA)-2 port and perform mandatory safety briefing for all crew members. **[IVA] [Imagery]**
2. Release Keep Alive Umbilical (KAU) from Orbiter Boom Sensor System (OBSS) and transfer the OBSS using the Shuttle Remote Manipulator System (SRMS) and the SSRMS. **[IVA] [Robotics] [EVA]**
   - Remove and retrieve the KAU Attachment Device (KAD) for return. **[EVA]**
3. Remove Shuttle Remote Manipulator System (SRMS) Elbow Camera Launch Locks. **[EVA]**
4. Rotate Expedition (E)16/17 FE-2 (1J/A) crew member with E17 (1J) FE-2 crew member, transfer mandatory crew rotation equipment per 1J Transfer Priority List (TPL) **<TBD I-1>** in Appendix I and perform mandatory tasks consisting of Individual Equipment Liner Kit (IELK) install and Sokol suit checkout. **[IVA] [Imagery]**
5. Install JAXA Japanese Experiment Module (JEM) - Pressurized Module (JPM) to Node 2 port Active Common Berthing Mechanism (ACBM) using the SSRMS. **[Imagery]**
   A. Disconnect Launch to Activation cables from the JPM. **[EVA]**
   B. Remove Passive Common Berthing Mechanism (PCBM) covers. **[EVA]**
   C. Perform Node 2 port ACBM sealing surface inspection. **[EVA]**
   D. Perform JPM PCBM sealing surface inspection. **[EVA]**
   E. Open Node 2 Hatch window cover to allow Centerline Berthing Camera System (CBCS) operations for JPM mate. **[EVA]**

F. Perform Node 2 port ACBM mate checkout. **[Ground]**

G. Mate JPM to Node 2 port ACBM using the SSRMS. **[Robotics] [Imagery]**

H. Provide power to JPM heaters via SSRMS. **[IVA] [Robotics]**

6. Activate a single power channel for JPM systems and JEM Remote Manipulator System (RMS) for survival heater power. This activation sequence includes utility jumper connectivity and Electrical Power System (EPS) jumper connectivity to allow for the JPM activation. **[IVA]**

A. Activate JPM cooling loop.

B. Activate heaters for the JPM.

C. Activate heaters for the Japanese Experiment Module Remote Manipulator System (JEMRMS).

7. Transfer mandatory quantities of water from Orbiter to ISS per Flight 1J TPL in Appendix I. **<TBD I-1> [IVA]**

8. Transfer critical items per Flight 1J TPL in Appendix I. **<TBD I-1>**. **[IVA]**

9. Perform minimum crew handover of 12 hours per rotating crew member which includes crew safety handover. **[IVA]**

10. Remove the Node 2 Port Aft Negative Pressure Relief Valves (NPRV) and replace with Inter-module Ventilation (IMV) valves. **[IVA]**

11. Configure PFEs/PBAs in JPM. **[IVA]**

12. Retrieve the JEMRMS system rack from the Japanese Experiment Logistics Module - Pressurized Section (JLP), ingress the JPM and install and activate the system rack and verify JEMRMS arm joints and temperature readings are within expected ranges. **[IVA]**

A. De-install CBCS equipment from Node 2 Port vestibule and remove Control Panel Assemblies (CPAs).

B. Relocate JEMRMS rack from JLP1F1 to JPM1A6.

13. Activate redundant channel for the JPM core systems. This activation sequence requires the relocation of racks from the JLP to the JPM. **[IVA]**

A. Configure Columbus for JEM installation (partial power down) and maintain mandatory power to payloads. **<TBR 6-7> [Ground]**

B. Retrieve 2 Rack Dummy Panels (Hard) from temporary stow location and install in JPM1D4 and JPM1F2.

C. Relocate JEM EPS1 from JLP1S2 to JPM1D2.

D. Relocate JEM DMS1 from JLP1P2 to JPM1O5.

E. Install second vestibule power jumper.

14. Reconfigure the heater controller power from SSRMS to JPM power to allow the SSRMS to ungrapple the JPM. **[Ground] [IVA]**

15. Perform JEMRMS Preparation and Partial Deploy.

    A. Remove the JEMRMS Multi-Layer Insulation (MLI) thermal covers. **[EVA]**

    B. Install the JEM Television Equipment (JTVE) secondary structure/camera assemblies and activate the JTVE heater power. **[EVA] [Imagery]**

    C. Perform partial deploy on JEMRMS. **[IVA] [Robotics]**

    D. Remove the MLI and Launch Locks from JEMRMS Wrist Vision Equipment (WVE) and Elbow Vision Equipment (EVE). **[EVA]**

16. Perform EVA to complete the tasks necessary for JLP relocation to the JPM. **[IVA] [EVA]**

    A. Release JPM zenith ACBM cover and inspect ACBM sealing surface for debris.

    B. Remove JPM zenith hatch pip pin launch lock.

17. Remove and replace the Starboard 1 (S1) Nitrogen Tank Assembly (NTA) using spare NTA located on External Stowage Platform (ESP)3. **[EVA]**

18. Transfer remaining racks from JLP to JPM. **[IVA]**

    A. Workstation (W/S) from JLP1A1 to JPM1F4.

    B. Relocate 2 Rack Dummy Panels (Hard) from JPM to JLP.

        1) JPM1F2 to JLP1F1

        2) JPM1D4 to JLP1P2

    C. Inter-Satellite Communication System/Proximity (ICS/PROX) from JLP1P1 to JPM1O4.

    D. SAIBO from JLP1A2 to JPM1A2.

    E. RYUTAI from JLP1F2 to JPM1A3.

    F. JPM Resupply Stowage Rack (JRSR)-1 from JLP1S1 to JPM1O3.

19. Configure Node 2 zenith vestibule for closeout, including disconnecting utilities and installation of CPAs. **[IVA]**

20. Relocate JLP from Node 2 zenith to JPM zenith location using SSRMS. **[IVA] [Robotics]**

    A. Install CBCS equipment in JPM zenith hatch.

    B. Perform JLP PCBM sealing surface inspection. **[Imagery]**

C. Relocate JLP from Node 2 zenith to JPM zenith location.

D. Perform Node 2 zenith ACBM demate checkout. **[Ground]**

E. Perform JPM zenith ACBM mate checkout. **[Ground]**

21. Activate JLP for survival heater power, including connectivity for utility jumpers. **[IVA]**

22. Perform JLP vestibule outfitting, remove JEM zenith CPAs and complete JLP activation. **[IVA]**

23. Reboost ISS with the Orbiter if mission resources allow and are consistent with ISS trajectory analysis and planning. **[IVA]**

24. Perform ISS daily payload status checks as required. **<TBD 6-6> [IVA]**

25. Perform daily middeck activities to support payloads (includes cases where shuttle crew also performs payloads on the ISS). **<TBD 6-6> [IVA]**

A. SDBI 1634, Sleep Short

B. Midodrine Long

C. Short Duration Bioastronautics Investigation (SDBI) 1900, Integrated Immune **<TBD 3-6>**

26. Transfer remaining cargo items per Flight 1J TPL in Appendix I. **<TBD I-1> [IVA]**

27. The following tasks are deemed to fit within the existing EVA timelines; however, may be deferred if the EVA is behind schedule. The EVA will not be extended to complete these tasks. **[EVA]**

A. Release two JPM ACBM Micrometeoroid Orbital Debris (MMOD) shield restraints.

B. Install JPM trunnion and keel pin covers. **[Imagery]**

C. Release JPM window shutter launch locks.

D. Remove Camera Port 9 External Television Camera Group (ETVCG) and install dummy box at camera port (CP) 9 location. **<TBR 6-3>**

E. Install Wireless Video System External Transceiver Assembly (WETA) 3. **<TBR 6-4>**

28. Disassemble ETVCG and prepare Television Camera Interface Controller (TVCIC) for return. **[IVA]**

29. Perform JEMRMS Final Deploy, maneuver to stow, and break checkout. **[IVA] [Robotics]**

30. Perform additional 4 hours per rotating crewmember of ISS crew handover (16 hours per crew member total). **[IVA]**

31. Perform ISS payload research operations tasks. **<TBD 6-6> [IVA]**

    A. NASA: Journals, Sleep Long, Integrated Immune **<TBD 3-6>**, Midodrine

    B. ESA: EuTEF, SOLAR, CFS-A, ALTCRISS

32. Perform imagery survey of the ISS exterior during Orbiter fly around after undock. **[IVA] [Imagery]**

33. Transfer required Nitrogen (N_2) from the Orbiter to the ISS Airlock (A/L) High Pressure Gas Tanks (HPGTs). **[IVA]**

34. Transfer required Oxygen (O_2) from the Orbiter to the ISS A/L HPGTs, as consumables allow. **[IVA]**

35. Remove the Positive Pressure Relief Valves (PPRV)s from Node 2, JPM Starboard, JPM Zenith, and JLP hatches and replace with Manual Pressure Equalization Valves (MPEV)s. **[IVA]**

36. Set up and checkout JEMRMS Backup Drive System per Appendix H. **<TBD H-1> [IVA]**

37. Install Hatch Window Hyzod covers on both sides of the Node 2 port hatch window. **[IVA]**

38. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, during JPM installation (IWIS required if Microgravity Acceleration Measurement System (MAMS) or Station Acceleration Measurement System (SAMS) unavailable). **[Ground] [Imagery]**

39. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, Dedicated ISS Thruster Firing, as consumables allow (IWIS required). **[IVA] [Ground] [Imagery]**

40. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, JLP Relocation (IWIS Required if MAMS or SAMS unavailable). **[IVA] [Ground] [Imagery]**

41. Perform Maui Analysis of Upper Atmospheric Injections (MAUI) (payload of opportunity - not required during docked operations). **[Ground]**

42. Perform Program-approved EVA get-ahead tasks. The following EVA get ahead tasks do not fit in the existing EVA timelines; however, the EVA team will be trained and ready to perform should the opportunity arise. EVA/Mission Operations Directorate (MOD) has the flexibility to select the tasks to be completed based on efficiencies gained in performing the already scheduled required tasks. **[EVA] [Imagery]**

    A. Deploy JPM and JLP MMOD shields.

    B. Install JPM EVA handrails and Worksite Interfaces (WIFs).

    C. Release FHRC S1 P-Clamps.

D. Release FHRC P1 P-Clamps.

E. R&R S02B-D RPCM for CMG2

F. Patch Panel Reconfig for CMG2

43. Install 6 Rack Dummy Panels (Hard) for steady state operations. **[IVA]**

A. JPM1D3, JPM1D4

B. JLP1F1, JLP1S1, JLP1S2, JLP1A1

44. Retrieve 13 Rack Dummy Panels (Soft) from JLP and install in JPM and JLP for steady state operations. **[IVA]**

A. JPM1F1, JPM1F2, JPM1F3, JPM1F5, JPM1F6, JPM1A1, JPM1A4, JPM1A5 and JPM1O2.

B. JLP1F2, JLP1A2, JLP1P1 and JLP1P2

45. Perform program approved IVA get-ahead tasks. The following IVA get ahead tasks do not fit in the existing IVA timelines; however, the IVA team will be trained and ready to perform should the opportunity arise. **[IVA] [Imagery]**

A. Remove the Node 2 Port Forward and JPM Starboard Forward Negative Pressure Relief Valves (NPRV) and replace with Inter-module Ventilation (IMV) valves.

B. JPM Rack Reconfiguration

C. Oxygen Generating System (OGS) Waste Water Check Valve Installation.

D. Install workstation monitor to workstation rack and assemble the table for System Laptop Terminal (SLT).

E. Install Common Hatch Handle Stowage Alignment Guides to Node 2, JPM Starboard, and JPM Zenith hatches.

6.5.3 ISS/VEHICLE ORBITAL AND CONFIGURATION REQUIREMENTS

6.5.3.1 The maximum rendezvous altitude for Flight 1J shall be 339 km (183 nmi).

6.5.3.2 The Orbiter shall dock at Pressurized Mating Adapter (PMA)-2.

6.5.3.3 The ISS with Shuttle docked shall be in Control Moment Gyroscope (CMG) control without ISS thrusters firing as well as the Shuttle Reaction Control System (RCS) inhibited for the following activities:

A. SSRMS unberthing of JPM until installation on Node 2 Port.

B. SSRMS unberthing of JLP from Node 2 Zenith until installation on JPM Zenith.

6.5.3.4 The ISS with Shuttle docked shall be in a free drift configuration with the CMGs not controlling, Shuttle RCS inhibited and without ISS thrusters firing for the following activities:

None identified.

6.5.3.5 The Space Station Remote Manipulator System (SSRMS) shall be located on PDGF 3 of the MT positioned at WS4 at the beginning of Flight 1J.

6.5.4 CONTINGENCY REQUIREMENTS

6.5.4.1 Mission Control Center - Houston (MCC-H) and Mission control Center - Moscow (MCC-M) shall build procedures, contingency timelines, and conduct training for the following non-EVA tasks. (The items listed below are for unique tasks or first implementation of new tasks. For contingency tasks not listed below, products/planning are already in place from previous flights/stages, or the ISS program has determined that resources will not be applied to develop products/planning until the contingency is invoked.):

- ISS critical maintenance tasks as follows:

  None identified.

6.5.4.2 MCC-H and MCC-M shall build procedures, contingency timelines, and provide pre-flight training for the EVA tasks to sufficient maturity to provide for the EVA response times designated.

A. Class 1: All procedures, timelines and training are developed and certified to support an EVA response within 24 hours.
   1. Orbiter TPS inspection.
   2. Common Berthing Mechanism (CBM) Contingencies:
      a. Clear/Restrain CBM Capture Latch
      b. Manually Open/Close CBM Petal
      c. Remove/Replace CBM Capture Latch
      d. Remove/Replace CBM Controller Panel Assembly (CPA)
      e. Remove/Replace CBM Petal
   3. Open/Close Payload Retention Latch Assembly (PRLA)
   4. Deploy and Stow Manipulator Positioning Mechanism (MPM)
   5. Release SRMS Shoulder Brace
   6. Release SRMS/SSRMS Flight Releasable Grapple Fixture (FRGF)/ERGF/PDGF

7. SSRMS Latching End Effector (LEE) Latch Drive
8. SSRMS Joint Drive
9. EVA Release of JEMRMS from HRM

B. Class 2: For contingencies occurring during the docked time frame an EVA response is available on a subsequent EVA based on re-prioritization of the mission tasks. Published procedures and timelines are developed, but may require real time updates to match the flight specific failure.

1. Mobile Servicing System (MSS) Extension Cable installation
2. Trailing Umbilical System (TUS) cable disconnect from Interface Umbilical Assembly (IUA)
3. RPCM/DDCU/MBSU remove and replace

C. Class 3: For contingencies related to first flights hardware that are not time critical, skeleton EVA procedures will be developed preflight to support a Class 3 EVA. The EVA response time can be greater than two weeks and can be deferred to the stage or next available mission. The ISS Program has determined that additional resources will not be applied to further refine the training and integrated planning until the failure occurs. Subsequent flight listings for these hardware items will be contained in the Generic Groundrules, Requirements, and Constraints (GGR&C).

None identified.

6.5.5 JETTISON REQUIREMENTS

Planning and product development, including safety data packages, will be performed to support jettison of the following items during EVA. This will include trajectory analysis to ensure acceptable low risk of recontact with ISS and of damage or injury following re-entry, procedures and training for the crew including worksite identification and desired jettison direction and velocity, and related hazard assessments, including joint safety review in accordance with SSP 50146.

6.5.5.1 Planned Jettison

The following items are planned for jettison during EVA in this flight:

A. U.S.:

- JAXA Hardware **<TBR 6-5>**
  - JPM PCBM MLI Cover and Contamination Seals
  - EVE MLI with Launch Lock
  - WVE MLI with Launch Lock
  - End Effector (EE) MLI

- Joint Motor Unit (JMU) MLI #1
- JMU MLI #2
- JMU MLI #3
- JMU MLI #4
- JMU MLI #5
- JMU MLI #6
- ACBM MLI Covers (port and starboard)
- Fwd JTVE Launch Lock
- Aft JTVE Launch Lock

B. Russian: None identified.

6.5.5.2 Contingency Jettison

The following items may require jettison if they cannot be configured safely to allow vehicle dockings or maneuvers or if their continued operation poses a hazard to the EVA crew.

A. U.S.: None identified.

B. Russian: None identified.

6.5.6 GROUND SYSTEMS REQUIREMENTS

A. Ground Support is required to operate Structural Dynamic Measurement System (SDMS), IWIS and External Wireless Instrumentation System (EWIS) for SDTO: 13005-U.

B. Common Berthing Mechanism demate and mate checkouts.

C. The JEM Flight Control Team (JFCT) at the Space Station Integration and Promotion Center (SSIPC), supported by the JEM Engineering Team (JET), and JAXA personnel at MCC-H, i.e. in ISS Management Center (IMC), International Partner Operations Center (IPOC) and Mission Evaluation Room (MER) will monitor the JPM installation, activation and ingress and JLP relocation and activation. Accommodation and Services to be provided by NASA are based on the JAXA requirements defined in the Facility and Communication Requirements for MCC-H/SSIPC Intercenter Operations (FRIO) (SSP 50585), Program Management Operations Interface Procedure (PMOIP) Annex A (SSP 50650-ANX A) and ISS Sustaining Engineering Interface Procedure (SEIP) (SSP 50745).

D. Ground support is highly desired to operate Station Acceleration Measurement System - II (SAMS-II), MAMS and Russian ALO (Optical Linear Accelerometers) sensors for SDTO: 13005-U. SAMS and MAMS availability will be assessed real time.

6.5.7 ISS REQUIREMENTS ON SHUTTLE DURING NONDOCKED TIME FRAME

A. NASA: Sleep Short (SDBI1634), Integrated Immune (SDBI 1900) **<TBD 3-6>**, Maui Analysis of Upper Atmospheric Injections (MAUI), Midodrine Long (returning crewmember)

B. ESA: None

6.6 FLIGHT 1J UNDOCK TO FLIGHT ULF2 DOCK REQUIREMENTS (STAGE 1J)

This paragraph identifies requirements applicable from Flight 1J undock to Flight ULF2 dock, including requirements associated with ATV1 undocking, 29 Progress-M docking/undocking, 30 Progress-M docking, 31 Progress-M docking, and 16 Soyuz-TMA relocation. **<FP TBR 3-8>**

6.6.1 <RESERVED>

6.6.2 STAGE 1J TASKS

These tasks, listed in order of ISS Program priority, are to be executed during this stage. The order of execution for these tasks in the nominal plan may vary depending on timeline efficiencies. The following numbered tasks, which include one Station-based Orlan EVA, shall be accomplished for successful completion of this interval.

1. Perform high priority ISS maintenance and Shuttle Launch Commit Criteria for the next flight. **[IVA] [Imagery]**
2. Relocate 16 Soyuz from DC1 Nadir port to FGB Nadir docking port. **[IVA] [Imagery]**
3. Dock 29 Progress-M to DC1 Nadir port and perform cargo/propellant transfer. **<FP TBR 3-8> [IVA] [Imagery]**
4. Complete 29 Progress-M loading of trash and undock from the DC1 Nadir port. **<FP TBR 3-8> [IVA] [Imagery]**
5. Complete ATV1 loading of trash and undock from SM Aft port. **<TBD 3-4> <FP TBR 3-38> [IVA] [Imagery]**
   A. Install and test ATV Control Panel and (Proximity Communication Equipment (PCE) prior to undock.
   B. Monitor ATV1 separation and departure.
   C. Remove and stow ATV Control Panel and PCE after undocking.
6. Dock 30 Progress-M to SM Aft port and perform cargo/propellant transfer. **<FP TBR 3-8> [IVA] [Imagery]**
7. Dock 31 Progress-M to DC1 Nadir port and perform cargo/propellant transfer. **<FP TBR 3-8> [IVA] [Imagery]**
8. Perform ISS medical operations (average of 10 crew hours per week crew of 3). **[IVA]**
9. Perform checkout and preparation tasks for Flight ULF2. **[IVA]**
   A. Position Mobile Transporter (MT) at WS #X **<TBD 6-7>** for Flight ULF2 joint operations (if not completed in Flight 1J). **[Robotics] [Ground]**

B. Perform Space Station Remote Manipulator System (SSRMS) pre-launch checkout at Node 2 Power Data Grapple Fixture (PDGF). **[Robotics] [Ground]**

C. Unstow and configure Joint Airlock.

D. Complete Flight ULF2 pre-pack.

E. Configure and check out EVA equipment.

F. Perform training and preparation for joint operations.

G. Complete Flight plan and EVA timeline reviews.

H. Perform tool preparation.

I. Perform transfer tag-up.

10. Perform imagery of Orbiter Thermal Protection System (TPS) during rendezvous R-bar Pitchover Maneuver (RPM) and downlink the data. **[IVA] [Imagery]**

- Perform proficiency training for imagery of Orbiter during RPM.

11. Perform high priority OBT (average of 4 **<TBD 6-4>** crew hours per week) substituting planned SSRMS/SPDM tasks as OBT when appropriate. **[IVA] [Robotics]**

12. Remove the Node 2 Port Forward and JPM Starboard Forward Negative Pressure Relief Valves (NPRV) and replace with Inter-module Ventilation (IMV) valves (if not completed during Flight 1J). **[IVA]**

13. Perform JLP fine leak check. **[IVA] [Ground]**

14. Perform JPM fine leak check. **[IVA] [Ground]**

15. Perform high priority ISS payload operations (average of **<TBD 6-4>** crew hours per week). **[IVA]**

A. NASA: Journals, Nutrition, Repository, Integrated Immune, Bisphosphonates, Midodrine Long, HRF facility operations (ops), LOCAD-PTS, SPHERES, MISSE 6, HRF Rack 1 Solid State Power Controller Module (SSPCM) R&R, Relocation and installation of EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Rack 4 sub-rack payloads from EXPRESS Rack 4 to another EXPRESS Rack (Ku Receiver, Commercial Generic Bioprocessing Apparatus (CGBA) 4, relocation of SAMS Interim Control Unit (ICU), CGBA 5, Analyzing Interferometer for Ambient Air (ANITA) **<TBD 6-8>**

B. ESA: Fundamental and Applied Studies of Emulsion Stability (FASES), 3D Space, EDT, NOA#1, NOA#2, IMMUNO, CFS-A, ALCTRISS, NEUROSPAT, EuTEF, SOLAR, EXPOSE-R

C. JAXA: Observation of flow and temperature fields in Marangoni convection (MEIS), High Definition Television (HDTV) activation and downlink, PADLES installation, Education Payload Operations (EPO) demos

16. Unpack and stow hardware delivered on Flight 1J. **[IVA]**

17. Transfer remaining FGB Enclosures from ATV1 prior to ATV undock, if not completed during Increment 16. **[IVA]**

18. Perform high priority ISS PAO events (average of **<TBD 6-4>** crew hours per week). **[IVA]**

19. Perform JPM/JLP system checkout per Appendix H. **<TBD H-1> [IVA]**

    A. Communication system checkout

    B. Video system checkout

    C. Flight crew system checkout

    D. Passive Thermal Control System (PTCS) checkout

    E. ECLSS system checkout

    F. Active Thermal Control System (ATCS) checkout

    G. Experiment support system checkout

    H. JEM Airlock initial checkout

20. Perform initial checkout of 2 Japanese payload racks (RYUTAI and SAIBO) per Appendix H. **<TBD H-1> [IVA]**

21. Perform ICS/PROX rack initial checkout per Appendix H. **<TBD H-1> [Ground]**

22. Perform the following rack relocations and checkouts (if not performed during Flight 1J). **<TBD 6-9> [IVA]**

    A. EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Rack (EXPR) #4 from LAB1P2 to JPM1F5

    B. EXPR #5 from LAB1S4 to JPM1F1

    C. Crew Health Care System (CHeCS) 1 from LAB1D4 to LAB1S4

    D. Human Research Facility (HRF) #2 from LAB1P4 to Columbus (COL)1A4

    E. HRF #1 from LAB1S2 to COL1F4

    F. Minus Eighty-Degree Laboratory Freezer for ISS (MELFI) from LAB1O4 to JPM1D4

    G. Zero-Gravity Stowage Rack (ZSR) from LAB1O5 to JPM1A1

    H. ZSR from NOD2D5 to JPM1A5

I. Relocate Cycle Ergometer with Vibration Isolation and Stabilization System (CEVIS) to accommodate the WHC rack. **<TBR D-1>**

23. Transition Command and Control System (CCS) CSCI from R6 to R7. **[IVA] [Ground]**
24. Transition Guidance, Navigation & Control (GN&C) CSCI from R6 to R7. **[IVA] [Ground]**
25. Transition Portable Computer System (PCS) CSCI from R10U to R11. **[IVA] [Ground]**
26. Transition Node Control Software (NCS) CSCI from R2 to R3. **[IVA] [Ground]**
27. Transition MSS 5.0 CSCI to MSS 5.1. **[IVA]**
28. Perform Columbus software Cycle 11 upload. **[IVA]**
29. Perform Russian EVA. **[EVA]**
    A. Install PDGF Transfer Frame on FGB.
    B. Install Video Signal Converter (VSC) Thermal Cover. **<TBR 6-6>**
    C. Install foot restraint adapter on Strela.
    D. Perform Vsplesk experiment activities.
30. Perform initial checkout and 2J/A commissioning checkout of JEMRMS including BDS. **[IVA] [Robotics] [Imagery]**
31. Install Hardware Command Panel (HCP) and cables, and perform PROX initial functional checkout per Appendix H. **<TBD H-1> [IVA] [Ground]**
32. Perform medium priority ISS maintenance. **[IVA] [Ground]**
33. Perform medium-priority ISS payloads operations (average of **<TBD 6-4>** crew hours per week). **[IVA]**
34. Transition Starboard 1/Port 1 (S1/P1) Computer Software Configuration Item (CSCI) from (Release) R2 to R3. **[IVA] [Ground]**
35. Transition Airlock Systems (ALSYS) CSCI R1 to R2. **[IVA] [Ground]**
36. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, for Dedicated Thruster Firing (IWIS required). **[IVA] [Imagery] [Ground]**
37. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 16S relocation. **[IVA] [Ground]**
38. Install FGB Enclosures, if time permits and not completed during Increment 16. **[IVA]**
39. Perform Special Purpose Dexterous Manipulator (SPDM) checkout. **<TBD 6-10>**

40. Perform low-priority OBT substituting planned SSRMS/SPDM tasks as OBT when appropriate. **[IVA] [Robotics]**
41. Perform remaining ISS PAO events. **[IVA] [Imagery]**
42. Perform remaining ISS maintenance. **[IVA]**
43. Perform remaining ISS payload operations. **[IVA]**
44. Reboost ISS with ATV1 Thrusters as required. **[Ground]**
45. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 29P docking to the DC1 Nadir port (IWIS required). **<FP TBR 3-8> [IVA] [Ground]**
46. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 30P docking to the SM Aft port (IWIS required). **<FP TBR 3-8> [IVA] [Ground]**
47. Perform SDTO 13007-U, ATV Docking/Undocking Loads on ISS, for ATV undocking from SM Aft port (IWIS Required). **<FP TBR 3-38> <TBD 3-4> [IVA] [Ground]**
48. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 31P docking to the DC1 Nadir port (IWIS required). **<FP TBR 3-8> [IVA] [Ground]**
49. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 29P undocking from the DC1 Nadir port (IWIS required). **<FP TBR 3-8> [IVA] [Ground]**
50. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, for ISS alone reboost (IWIS required). **[IVA] [Imagery] [Ground]**
51. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, during ULF2 Orbiter docking (IWIS required) (only if crew time available). **[IVA] [Imagery] [Ground]**
52. Perform Z-Panel modification for location LAB1S3 (if not completed in Flight 1J/A) and for location LAB1S2 after relocation of HRF1 rack. **[IVA]**

6.6.3 ISS/VEHICLE ORBITAL AND CONFIGURATION REQUIREMENTS

6.6.3.1 The 16 Soyuz-TMA shall relocate from the DC1 Nadir port to the FGB Nadir port.

6.6.3.2 The 29 Progress-M shall dock to the DC1 Nadir port. **<FP TBR 3-8>**

6.6.3.3 The ATV1 shall undock from the SM Aft port. **<TBD 3-4> <FP TBR 3-38>**

6.6.3.4 The 29 Progress-M shall undock from the DC1 Nadir port. **<FP TBR 3-8>**

6.6.3.5 The 30 Progress-M shall dock to the SM Aft port. **<FP TBR 3-8>**

6.6.3.6 The 31 Progress-M shall doc k to the DC1 Nadir port. **<FP TBR 3-8>**

6.6.3.7 The ISS shall be in CMG control without ISS thrusters firing for the following activities:

None identified.

6.6.3.8 The ISS attitude for ATV1 undocking shall be LVLH (0,0,0).

6.6.3.9 The USOS solar arrays must be feathered to **<TBD 3-4>** angle for **<TBD 3-4>** minutes prior to undocking of the ATV1.

6.6.3.10 The ISS shall be in free drift configuration with the CMGs not controlling and without ISS thrusters firing for the following activities:

- ISS shall mode to free drift before physical separation of ATV1. The free drift time should be sufficient for the MCC-M assessment of the mode execution; ATV1 commanding of hooks opening and physical completion of hooks opening, but not exceed 7 minutes and 10 seconds.

6.6.4 CONTINGENCY REQUIREMENTS

6.6.4.1 MCC-H and MCC-M shall build procedures, contingency timelines, and conduct training to allow the crew to perform the following non-EVA tasks. The items listed below are for unique tasks or first implementation of new tasks. For contingency tasks not listed below, products/planning are already in place from previous flights/stages, or the ISS Program has determined that resources will not be applied to develop products/planning until the contingency is invoked:

A. ISS critical maintenance tasks as follows:

   None identified.

B. Complete critical unfinished Flight 1J assembly tasks as follows:

   None identified.

C. Remove/replace critical spares as follows:

   None identified.

6.6.4.2 MCC-H and MCC-M shall build task specific procedures, contingency timelines, and conduct training to a high level sufficient to meet the following objectives:

- Identify task specific technical and safety issues.
- Identify on-board equipment required to perform the task.
- Determine the scope of effort required to prepare for the specific configurations, locations, and environmental conditions for the EVA.

- Provide the crew with the proper skill set required to perform the tasks given the on-board proficiency training assets available.

The readiness of these tasks will be based upon the generic development of the task procedures and timelines to a level that can be validated against a set of criteria defined in the “Process for EVA Readiness” in the GGR&C. For contingency tasks, products/planning are already in place from previous flights/stages, and the ISS Program has determined that resources will not be applied to develop products/planning and the feasibility to perform those tasks on this flight/increment will be undetermined until the contingency is invoked.

A. ISS critical maintenance tasks as follows:

   The tasks listed in Paragraph 6.4.4.2 are still applicable.

B. Complete critical unfinished Flight 1J assembly tasks as follows:

   None identified.

C. Remove/replace critical spares as follows:

   None identified.

D. Contingency MT safing requirement:

   - Contingency EVA power cable routing for stranded MT. (For Increment 17, this requirement will be met with already accomplished skills based training and additional OBT if the contingency is invoked.)

6.6.5 JETTISON REQUIREMENTS

Planning and product development, including safety data packages, will be performed to support jettison of the following items during EVA. This will include trajectory analysis to ensure acceptable low risk of recontact with ISS and of damage or injury following re-entry, procedures and training for the crew including worksite identification and desired jettison direction and velocity, and related hazard assessments, including joint safety review in accordance with SSP 50146.

6.6.5.1 Planned Jettison

The following items are planned for jettison during EVA in this stage:

A. U.S.: None identified.

B. Russian: None identified.

6.6.5.2 Contingency Jettison

The following items may require jettison if they cannot be configured safely to allow vehicle dockings or maneuvers or if their continued operation poses a hazard to the EVA crew.

A. U.S.: None identified.

B. Russian: None identified.

6.6.6 GROUND SYSTEMS REQUIREMENTS

A. Ground Support is required to operate Structural Dynamic Measurement System (SDMS), IWIS and External Wireless Instrumentation System (EWIS) for SDTOs: 13004-U, 13005-U, and 13007-U.

B. Ground support is highly desired to operate Station Acceleration Measurement System - II (SAMS-II), MAMS and Russian ALO (Optical Linear Accelerometers) sensors for SDTO DTOs: 13004-U, 13005-U, and 13007-U. SAMS and MAMS availability will be assessed real time.

C. Ground Systems are required for MT positioning.

D. Ground Systems are required for SSRMS pre-launch check out.

E. Ground Systems are required for JLP and JPM fine leak checks.

F. Ground Systems are required for ICS/Prox rack check out.

G. Ground Systems are required for CSCI upgrades.

6.7 FLIGHT ULF2 REQUIREMENTS

This paragraph identifies ISS requirements during Flight ULF2. Detailed requirements and agreements between the ISS Program and the Space Shuttle Program are specified in NSTS 21514, International Space Station Mission Utilization Logistics Flight 2 (ULF2) Integration Plan.

6.7.1 <RESERVED>

6.7.2 FLIGHT ULF2 TASKS (IN DESCENDING PRIORITIZED ORDER)

These tasks, listed in order of ISS Program priority, are to be executed during this flight. The order of execution for these tasks in the nominal plan may vary, depending on timeline efficiencies. The Flight ULF2 Task Priorities have been prepared so that, in the event of a shortened mission, task execution order can be modified such that all mandatory tasks will be completed. The following numbered tasks, which include four Station-based EVAs to be performed by the Orbiter crew, shall be accomplished for successful completion of this flight:

1. Dock Flight ULF2 to Pressurized Mating Adapter (PMA)-2 port and perform mandatory safety briefing for all crew members. **[IVA] [Imagery]**
2. Rotate E17 FE-2 (1J) crew member with E17/18 FE-2 (ULF2) crew member, transfer mandatory crew rotation equipment per ULF2 TPL in Appendix I and perform mandatory tasks consisting of IELK install and Sokol suit checkout. **[IVA] [Imagery]**
3. Berth Multi-Purpose Logistics Module (MPLM) to ISS Node 2 using SSRMS; activate and checkout MPLM. **[IVA] [Robotics]**
4. Transfer mandatory quantities of water from Orbiter to ISS per Flight ULF2 TPL in Appendix I. **[IVA]**
5. Transfer critical items per Flight ULF2 TPL in Appendix I. **[IVA]**
6. Perform minimum crew handover of 12 hours per rotating crew member which includes crew safety handover. **[IVA]**
7. Return MPLM to the cargo bay using SSRMS. **[IVA] [Robotics]**
8. Transfer Flex Hose Rotary Coupler (FHRC) from the Lightweight Multi-Purpose Experiment Support Structure (MPESS) Carrier (LMC) to the ESP3, Site #2 using SSRMS. [requires NTA move to a temporary location.**[EVA] [Robotics]**
9. Transfer and install ISS MPLM items/racks to the ISS. **[IVA]**
   A. CHeCS 2 (ZSR) to LAB1O5.
   B. EXPR #6 (includes Galley) to LAB1O4.
   C. WRS2 to LAB1P4.

D. WHC to LAB1P2.

E. WRS1 to LAB1D4.

F. Combustion Integration Rack (CIR) (PaRIS) to LAB1S3.

G. TRDML 2 to NOD2D5.

H. Crew Quarters to NOD2P5.

I. Crew Quarters to NOD2S5.

J. Crew Quarters to NOD2O5.

K. ZSR to JLP1F2.

10. Return NTA from the ESP3 (temporary location) to the LMC using SSRMS. **[EVA] [Robotics]**
11. Transfer remaining cargo items per Flight ULF2 TPL in Appendix I. **[IVA]**
12. Relocate P6 PDGF from P6 to FGB using SSRMS. **[EVA] [Robotics]**
13. Relocate 2 Crew and Equipment Translation Aid (CETA) carts from starboard-starboard to port-port using SSRMS. **[EVA] [Robotics]**
14. Perform Development Test Objective (DTO) 848 Tile Repair Ablator Dispenser (TRAD). **<TBD 3-5> [EVA]**
15. Perform daily middeck activities to support payloads (includes cases where shuttle crew also performs payloads on the ISS). **[IVA]**
16. Perform ISS daily payload status checks as required. **[IVA]**
17. Transfer required N_2 from the Orbiter to the ISS A/L HPGTs. **[IVA]**
18. Transfer required O_2 from the Orbiter to the ISS A/L HPGTs. **[IVA]**
19. Perform Exposed Facility Berthing Mechanism checkout. **[EVA] [IVA] [Ground]**
20. Install two (2) JAXA Proximity Global Positioning System (GPS) antennas on JLP using SSRMS. **[EVA] [Robotics]**
21. Install External Television Camera Group (ETVCG) at Camera Port (CP)7 using SSRMS. **[IVA] [EVA] [Robotics]**
22. Perform additional 4 hours per rotating crewmember of ISS crew handover (16 hours per crew member total). **[IVA]**
23. Reconfigure Portable Fire Extinguisher (PFE)/Portable Breathing Apparatus (PBA) in JPM.
24. Reboost ISS with the Orbiter if mission resources allow and are consistent with ISS trajectory analysis and planning. **[IVA]**

25. Perform imagery survey of the ISS exterior during Orbiter fly around after undock. **[IVA] [Imagery]**

26. The following tasks are deemed to fit within the existing EVA timelines; however, may be deferred if the EVA is behind schedule. The EVA will not be extended to complete these tasks. **[EVA]**

    None identified.

27. Perform ISS payload research operations tasks. **[IVA]**

    A. NASA: **<TBD 3-8>**

    B. ESA: **<TBD 3-8>**

28. Perform Program-approved EVA get-ahead tasks. The following EVA get ahead tasks do not fit in the existing EVA timelines; however, the EVA team will be trained and ready to perform should the opportunity arise. EVA MOD has the flexibility to select the tasks to be completed based on efficiencies gained in performing the already scheduled required tasks. **[EVA] [Imagery]**

    None identified.

29. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, during Shuttle mated ISS reboost (IWIS required) (only if crew time available). **[IVA] [Imagery] [Ground]**

30. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, during ULF2 Orbiter undocking (IWIS highly desired, but not required) (only if crew time available). **[IVA] [Ground]**

6.7.3 ISS/VEHICLE ORBITAL AND CONFIGURATION REQUIREMENTS

6.7.3.1 The maximum rendezvous, altitude for Flight ULF2 shall be 352 km (190 nmi).

6.7.3.2 The Orbiter shall dock at Pressurized Mating Adapter (PMA)-2.

6.7.3.3 The ISS with Shuttle docked shall be in Control Moment Gyroscope (CMG) control without ISS thrusters firing as well as the Shuttle Reaction Control System (RCS) inhibited for the following activities:

A. Unberth of MPLM from Orbiter Payload Bay (PLB).

B. Mating of MPLM to Node 2.

C. Demate of MPLM from Node 2.

D. Berthing of MPLM in Orbiter PLB.

6.7.3.4 The ISS with Shuttle docked shall be in a free drift configuration with the CMGs not controlling, Shuttle RCS inhibited and without ISS thrusters firing for the following activities:

None identified.

6.7.3.5 The Space Station Remote Manipulator System (SSRMS) shall be located on the Node 2 at the beginning of Flight ULF2.

6.7.4 CONTINGENCY REQUIREMENTS

6.7.4.1 Mission Control Center - Houston (MCC-H) and Mission Control Center - Moscow (MCC-M) shall build procedures, contingency timelines, and conduct training for the following non-EVA tasks. (The items listed below are for unique tasks or first implementation of new tasks. For contingency tasks not listed below, products/planning are already in place from previous flights/stages, or the ISS Program has determined that resources will not be applied to develop products/planning until the contingency is invoked.):

A. ISS critical maintenance tasks as follows:

   None identified.

B. Orbiter TPS inspection.

6.7.4.2 MCC-H and MCC-M shall build procedures, contingency timelines, and provide pre-flight training for the EVA tasks to sufficient maturity to provide for the EVA response times designated.

A. Class 1: All procedures, timelines and training are developed and certified to support an EVA response within 24 hours.

   1. Clear/restrain CBM Capture Latch
   2. Manually open/close CBM Petal
   3. Remove/replace Center Disk Cover
   4. Remove/replace CBM Capture Latch
   5. Remove/replace CBM Controller Panel Assembly (CPA)
   6. Remove/replace CBM Petal
   7. Manual release of SSRMS from MPLM Flight Releasable Grapple Fixture (FRGF).

B. Class 2: For contingencies occurring during the docked time frame an EVA response is available on a subsequent EVA based on re-prioritization of the mission tasks. Published procedures and timelines are developed, but may require real time updates to match the flight specific failure.

   None identified.

C. Class 3: For contingencies related to first flights hardware that are not time critical, skeleton EVA procedures will be developed preflight to support a Class 3 EVA. The

EVA response time can be greater than two weeks and can be deferred to the stage or next available mission. The ISS Program has determined that additional resources will not be applied to further refine the training and integrated planning until the failure occurs. Subsequent flight listings for these hardware items will be contained in the Generic Groundrules, Requirements, and Constraints (GGR&C).

None identified.

6.7.5 JETTISON REQUIREMENTS

Planning and product development, including safety data packages, will be performed to support jettison of the following items during EVA. This will include trajectory analysis to ensure acceptable low risk of recontact with ISS and of damage or injury following re-entry, procedures and training for the crew including worksite identification and desired jettison direction and velocity, and related hazard assessments, including joint safety review in accordance with SSP 50146.

6.7.5.1 Planned Jettison

The following items are planned for jettison during EVA in this flight:

A. U.S.: None identified.

B. Russian: None identified.

6.7.5.2 Contingency Jettison

The following items may require jettison if they cannot be configured safely to allow vehicle dockings or maneuvers or if their continued operation poses a hazard to the EVA crew.

A. U.S.: None identified.

B. Russian: None identified.

6.7.6 GROUND SYSTEMS REQUIREMENTS

A. Ground Support is required to operate Structural Dynamic Measurement System (SDMS), IWIS and External Wireless Instrumentation System (EWIS) for SDTO: 13005-U.

B. Ground support is highly desired to operate Station Acceleration Measurement System - II (SAMS-II), MAMS and Russian ALO (Optical Linear Accelerometers) sensors for SDTO: 13005-U. SAMS and MAMS availability will be assessed real time.

6.7.7 ISS REQUIREMENTS ON SHUTTLE DURING NONDOCKED TIME FRAME

A. NASA: **<TBD 3-8>**

B. ESA: **<TBD 3-8>**

6.8 FLIGHT ULF2 UNDOCK TO FLIGHT 17S DOCK REQUIREMENTS (STAGE ULF2)

This paragraph identifies requirements applicable from Flight ULF2 undock to Flight 17 Soyuz-TMA dock, including requirements associated with 30 Progress-M undocking **<FP TBR 3-8>**.

6.8.1 <RESERVED>

6.8.2 STAGE ULF2 TASKS

These tasks, listed in order of ISS Program priority, are to be executed during this stage. The order of execution for these tasks in the nominal plan may vary depending on timeline efficiencies. The following numbered tasks, which include no Station-based EVAs, shall be accomplished for successful completion of this interval.

1. Perform high priority ISS maintenance and Shuttle Launch Commit Criteria for the next flight. **[IVA] [Imagery]**
2. Complete 30P loading of trash and undock from the SM Aft port. **<FP TBR 3-8> [IVA] [Imagery]**
3. Perform ISS medical operations (average of 10 crew hours per week crew of 3). **[IVA]**
4. Perform checkout and preparation tasks for Flight 17 Soyuz arrival and Flight 16 Soyuz crew return. **[IVA]**
   A. Complete pre-pack.
   B. Perform training and preparation for joint operations.
   C. Perform Soyuz on-orbit vehicle training/familiarization training for Soyuz 16 return.
   D. Complete Flight Plan reviews.
   E. Perform tool preparation.
   F. Perform transfer tag-up.
5. Perform high priority OBT (average of 4 **<TBD 6-4>** crew hours per week) substituting planned SSRMS/SPDM tasks as OBT when appropriate. **[IVA] [Robotics]**
6. Unpack and stow hardware delivered on Flight ULF2. **[IVA]**
7. Perform high priority ISS payload operations (average of **<TBD 6-4>** crew hours per week). **[IVA]**
   A. NASA: Journals, Nutrition, Repository, Sleep Long, Integrated Immune, Bisphosphonates, Midodrine Long.

B. ESA: IMMUNO, SAMPLE, ETD, ALTCRISS, Colored Fungi in Space (CFS-A), EXPOSE-R, EuTEF, Solar variability and irradiance monitor (SOLAR).

C. JAXA: Rad Gene & LOH, Ice Crystal.

8. Perform high priority ISS PAO events (average of **<TBD 6-4>** crew hours per week). **[IVA]**
9. Perform medium priority ISS maintenance. **[IVA]**
10. Perform medium-priority ISS payloads operations (average of **<TBD 6-4>** crew hours per week). **[IVA]**
11. Transition Photovoltaic Control Application (PVCA) Computer Software Configuration Item (CSCI) from R2 to R3. **<TBR 6-2> [IVA] [Ground]**
12. Perform low-priority OBT substituting planned SSRMS/SPDM tasks as OBT when appropriate. **[IVA] [Robotics]**
13. Perform remaining ISS PAO events. **[IVA] [Imagery]**
14. Perform remaining ISS maintenance. **[IVA]**
15. Perform remaining ISS payload operations. **[IVA]**
16. Perform SPDM On-orbit Checkout Requirements (OCRs) per the priorities in Appendix H **<TBD H-1>**. **[IVA] [Robotics] [Imagery] [Ground]**
17. Perform SDTO 13004-U, Russian Vehicle Docking/Undocking Loads on ISS, for 30P undocking from the SM Aft port (IWIS required). **<FP TBR 3-8> [IVA] [Ground]**

6.8.3 ISS/VEHICLE ORBITAL AND CONFIGURATION REQUIREMENTS

6.8.3.1 The 30 Progress-M shall undock from the SM Aft port. **<FP TBR 3-8>**

6.8.3.2 The ISS shall be in CMG control without ISS thrusters firing for the following activities:

None identified.

6.8.3.3 The ISS shall be in free drift configuration with the CMGs not controlling and without ISS thrusters firing for the following activities:

None identified.

6.8.4 CONTINGENCY REQUIREMENTS

6.8.4.1 MCC-H and MCC-M shall build procedures, contingency timelines, and conduct training to allow the crew to perform the following non-EVA tasks. The items listed below are for unique tasks or first implementation of new tasks. For contingency tasks not listed below, products/planning are already in place from previous flights/stages, or

the ISS Program has determined that resources will not be applied to develop products/planning until the contingency is invoked:

A. ISS critical maintenance tasks as follows:

None identified.

B. Complete critical unfinished Flight ULF2 assembly tasks as follows:

None identified.

C. Remove/replace critical spares as follows:

None identified.

6.8.4.2 MCC-H and MCC-M shall build task specific procedures, contingency timelines, and conduct training to a high level sufficient to meet the following objectives:

- Identify task specific technical and safety issues.
- Identify on-board equipment required to perform the task.
- Determine the scope of effort required to prepare for the specific configurations, locations, and environmental conditions for the EVA.
- Provide the crew with the proper skill set required to perform the tasks given the on-board proficiency training assets available.

The readiness of these tasks will be based upon the generic development of the task procedures and timelines to a level that can be validated against a set of criteria defined in the “Process for EVA Readiness” in the GGR&C. For contingency tasks, products/planning are already in place from previous flights/stages, and the ISS Program has determined that resources will not be applied to develop products/planning and the feasibility to perform those tasks on this flight/increment will be undetermined until the contingency is invoked.

A. ISS critical maintenance tasks as follows:

The tasks listed in Paragraph 6.4.4.2 are still applicable.

B. Complete critical unfinished Flight ULF2 assembly tasks as follows:

None identified.

C. Remove/replace critical spares as follows:

None identified.

6.8.5 JETTISON REQUIREMENTS

Planning and product development, including safety data packages, will be performed to support jettison of the following items during EVA. This will include trajectory analysis to ensure acceptable low risk of recontact with ISS and of damage or injury following re-entry, procedures and training for the crew including worksite identification and desired jettison direction and velocity, and related hazard assessments, including joint safety review in accordance with SSP 50146.

6.8.5.1 Planned Jettison

The following items are planned for jettison during EVA in this stage:

A. U.S.: None identified.

B. Russian: None identified.

6.8.5.2 Contingency Jettison

The following items may require jettison if they cannot be configured safely to allow vehicle dockings or maneuvers or if their continued operation poses a hazard to the EVA crew.

A. U.S.: None identified.

B. Russian: None identified.

6.8.6 GROUND SYSTEMS REQUIREMENTS

A. Ground Support is required to operate Structural Dynamic Measurement System (SDMS), IWIS and External Wireless Instrumentation System (EWIS) for SDTO: 13004-U.

B. Ground support is highly desired to operate Station Acceleration Measurement System - II (SAMS-II), MAMS and Russian ALO (Optical Linear Accelerometers) sensors for SDTO: 13004-U. SAMS and MAMS availability will be assessed real time.

APPENDIX A - ACRONYMS AND ABBREVIATIONS

A/L	Airlock
AAA	Avionics Air Assembly
ACBM	Active Common Berthing Mechanism
ACU	Arm Computer Unit
ALO	Optical Linear Accelerometers
ALSYS	Airlock Systems
ANITA	Analyzing Interferometer for Ambient Air
ANX	Annex
APPC	Arm Pitch Plane Change
ARS	Air Revitalization System
ATCS	Active Thermal Control System
ATV	Automated Transfer Vehicle
BCDU	Battery Charge/Discharge Unit
BDS	Backup Drive System
CBCS	Centerline Berthing Camera System
CBM	Common Berthing Mechanism
CCAA	Common Cabin Air Assembly
CCS	Command and Control System
CDR	Commander
CEO	Crew Earth Observations
CETA	Crew and Equipment Translation Aid
CEVIS	Cycle Ergometer with Vibration Isolation and Stabilization System
CFE	Capillary Flow Experiment
CFS-A	Colored Fungi in Space
CGBA	Commercial Generic Bioprocessing Apparatus
CHeCS	Crew Health Care System
CIR	Combustion Integration Rack
CLA	Camera and Light Assembly
CLPA	Camera Light Pan Tilt Assembly
CM	Crewmember
CMG	Control Moment Gyroscope
CoFR	Certification of Flight Readiness
COL	Columbus
CP	Camera Port
CPA	Control Panel Assembly
CR	Change Request
CSA	Canadian Space Agency
CSCI	Computer Software Configuration Item
CSD	Common Schedule Database
CTBE	Cargo Transfer Bag Equivalent
CWC	Contingency Water Container

DC	Docking Compartment
DCSU	Direct Current Switching Unit
DDCU	Direct Current-to-Direct Current Converter Unit
deg	degree
DMT	Decreed Moscow Time
DQA	Document Quality Assurance
DTO	Development Test Objective
E	Expedition
e.g.	for example
EarthKAM	Earth Knowledge Acquired by Middle School
ECLSS	Environmental Control and Life Support System
EDMS	Electronic Document Management System
EDR	European Drawer Rack
EE	End Effector
ELITE-S2	Elaboratore Immagini Televisive 2nd Generation
EMCS	European Modular Cultivation System
EMU	Extravehicular Mobility Unit
EPM	European Physiology Module
EPO	Education Payload Operations
EPS	Electrical Power System
ESA	European Space Agency
ESP	External Stowage Platform
ETC	European Transportation Carrier
ETCS	External Thermal Control System
ETVCG	External Television Camera Group
EuTEF	European Technology Exposure Facility
EVA	Extravehicular Activity
EVE	Elbow Vision Equipment
EWIS	External Wireless Instrumentation System
EXPR	EXPRESS
EXPRESS	EXpedite the PRocessing of Experiments to the Space Station
EXT	External
F	Flight
FASES	Fundamental and Applied Studies of Emulsion Stability
FE	Flight Engineer
FEL	First Element Launch
FGB	Functional Cargo Block
FHRC	Flex Hose Rotary Coupler
FMA	Force/Moment Accommodation
FMS	Force Moment Sensor
FOV	Field of View
FP	Flight Program
FRAM	Flight Releasable Attach Mechanism
FRGF	Flight Releasable Grapple Fixture

Fwd	Forward
GC	Gas Chromatograph
GF	Grapple Fixture
GGR&C	Generic Groundrules, Requirements, and Constraints
GN&C	Guidance Navigation & Control
GN2	Gaseous Nitrogen
GPS	Global Positioning System
H/W	Hardware
H2O	Water
HDTV	High Definition Television
HPGT	High Pressure Gas Tank
HRF	Human Research Facility
hrs	hours
HTV	H-2 Transfer Vehicle
I-	Increment minus
ICS	Inter-Satellite Communication System
ICU	Interim Control Unit
IDRD	Increment Definition and Requirements Document
IELK	Individual Equipment Liner Kit
IFHX	Interface Heat Exchanger
IMC	ISS Management Center
IMV	Intra-module Ventilation
in	Inch
Inc	Increment
IP	International Partner
ISPR	International Standard Payload Rack
ISS	International Space Station
ISS MORD	International Space Station Medical Operations Requirements Documents
IUA	Interface Umbilical Assembly
IVA	Intravehicular Activity
IWIS	ISS Wireless Instrumentation System
JAXA	Japan Aerospace Exploration Agency
JEM	Japanese Experiment Module
JEMRMS	Japanese Experiment Module Remote Manipulator System
JEU	Joint Electronic Unit
JLP	Japanese Experiment Logistics Module - Pressurized Section
JPM	JEM Pressurized Module
JRSR	JEM Resupply Stowage Rack
JSC	Johnson Space Center
JTVE	JEM Television Equipment
KAU	Keep Alive Umbilical

kg	kilogram
km	kilometer
KSC	Kennedy Space Center
kW	kilowatt
L-	Launch minus
LAB	Laboratory
lb	pound
LEE	Latching End Effector
LMC	Lightweight MPESS Carrier
LOCAD-PTS	Lab-On-a-Chip Applications Development - Portable Test System
LTA	Launch to Activation
LTL	Low Temperature Loop
LVLH	Local Vertical Local Horizontal
m3	cubic meter
MAMS	Microgravity Acceleration Measurement System
MAUI	Maui Analysis of Upper Atmospheric Injections
Max	Maximum
MBS	MRS Base System
MBSU	Main Bus Switching Unit
MCC	Mission Control Center
MCC-H	Mission Control Center - Houston
MCC-M	Mission Control Center - Moscow
MCOP	Multilateral Crew Operations Panel
MDM	Multiplexer/Demultiplexer
MEIS	Observation of flow and temperature fields in Marangoni convection
MELFI	Minus Eighty-Degree Laboratory Freezer for ISS
MER	Mission Evaluation Room
MIC	Mission Integration Contract
min	Minute
MIS	Microspace
MISSE	Materials International Space Station Experiment
MLE	Middeck Locker Equivalent
MLI	Multi-Layer Insulation
MMOD	Micrometeoroid Orbital Debris
MOD	Mission Operations Directorate
MOP	Motion Perception: Vestibular adaptation to G-transitions
MPCB	Multilateral Payloads Control Board
MPESS	Multi-Purpose Experiment Support Structure
MPEV	Manual Pressure Equalization Valve
MPLM	Multi-Purpose Logistics Module
MRS	Mobile Remote Servicer
MSG	Microgravity Science Glovebox
MSS	Mobile Servicing System
MT	Mobile Transporter

MTL	Moderate Temperature Loop
MUS	Muscle
N/A	Not Applicable
N2	Nitrogen
NASA	National Aeronautics and Space Administration
NCS	Node Control Software
NH3	Ammonia
nmi	nautical mile
NPRV	Negative Pressure Relief Valve
NSTS	National Space Transportation System
NTA	Nitrogen Tank Assembly
O2	Oxygen
OBSS	Orbiter Boom Sensor System
OBT	Onboard Training
OCA	Orbiter Communication Adapter
OCR	On-orbit Checkout Requirement
OGS	Oxygen Generating System
ONS	Off-Nominal Situation
Ops	Operations
ORG	Organization
ORU	Orbital Replacement Unit
OTCM	ORU Tool Change-out Mechanism
OV	Orbiter Vehicle
P	Progress
PAO	Public Affairs Office
PBA	Portable Breathing Apparatus
PCBM	Passive Common Berthing Mechanism
PCE	Proximity Communication Equipment
PCS	Portable Computer System
PDB	Power Distribution Box
PDGF	Power Data Grapple Fixture
PFCS	Pump Flow Control Subassembly
PFE	Portable Fire Extinguisher
PL	Payload
PLB	Payload Bay
PLBD	Payload Bay Doors
PM	Pressurized Module
PMA	Pressurized Mating Adapter
POR	Point of Resolution
PPRV	Positive Pressure Relief Valve
PRLA	Payload Retention Latch Assembly
PROX	Proximity
PSSC	Pico-Satellite Solar Cell experiment
PVCA	Photovoltaic Control Application

PVCU	Photovoltaic Controller Unit
PWR	Portable Water Reservoir
R Sz	Soyuz Rotation
R&R	Remove and Replace
RCS	Reaction Control System
Ref	Reference
RF	Radio Frequency
RIP	Requirements Integration Panel
RMS	Remote Manipulator System
ROALD	Role of programmed cell Apoptosis in the Depression of T-Lymphocyte
RPCM	Remote Power Control Mechanism
RPM	R-bar Pitchover Maneuver
RS	Russian Segment
RSA	Russian Space Agency
RSC-E	Rocket Space Corporation - Energia
RSR	Resupply Stowage Rack
RVE	Rack Volume Equivalent
RWS	Robotic Workstation
S	Stage
SAMS	Station Acceleration Measurement System
SAMS-II	Station Acceleration Measurement System - II
SAW	Solar Array Wing
SDBI	Short Duration Bioastronautics Investigation
SDMS	Structural Dynamic Measurement System
SDTO	Station Development Test Objective
SE	Sensor Enclosure
SEITE	Shuttle Exhaust Ion Turbulence Experiment
SM	Service Module
SOLAR	Solar variability and irradiance monitor
SORR	Stage Operations Readiness Review
SPDM	Special Purpose Dexterous Manipulator
SPHERES	Synchronized Position Hold Engage Reorient Experimental Satellites
SPIP	Station Program Implementation Plan
SRMS	Shuttle Remote Manipulator System
SSC	Station Support Computer
SSCB	Space Station Control Board
SSCD	Space Station Change Directive
SSIPC	Space Station Integration and Promotion Center
SSP	Space Station Program
SSPCB	Space Station Program Control Board
SSPCM	Solid State Power Controller Module
SSPTS	Station/Shuttle Power Transfer System
SSRMS	Space Station Remote Manipulator System
SSU	Sequential Shunt Unit

STS	Space Transportation System
Sz	Soyuz
TBD	To Be Determined
TBR	To Be Resolved
TCS	Thermal Control System
temp	temporary
TESS	Temporary Early Sleep Station
TMA	Transportation Modified Anthropometric
TO	Target Object
TPL	Transfer Priority List
TPS	Thermal Protection System
TRAD	Tile Repair Ablator Dispenser
TUS	Trailing Umbilical System
TVCIC	Television Camera Interface Controller
U.S.	United States
U.S. Lab	United States Laboratory
ULF	Utilization Logistics Flight
URL	Uniform Resource Locator
USOS	United States On-orbit Segment
V	Velocity Vector
VC	Visiting Crew
vs.	versus
VSC	Video Signal Converter
W/S	Workstation
WAICO	Wild Type Arabidopsis Roots Grown in Space
WETA	Wireless Video System External Transceiver Assembly
WG	Working Group
WIF	Worksite Interface
WR	Wrist Roll
WS	Work Site
WVE	Wrist Vision Equipment
XPOP	X-Axis Perpendicular to the Orbital Plane
XVV	X-Axis into the Velocity Vector
ZSR	Zero-Gravity Stowage Rack

APPENDIX B - GLOSSARY OF TERMS

ACCOMMODATIONS

Launch vehicles or ISS physical locations where utilization or system items are stowed or installed. The following specific types of accommodations are recognized (the unit of measure of the accommodation is shown in parentheses):

A. Rack locations (number)

B. MLEs

C. CTBEs

D. Pressurized volume (RVE)

E. Unpressurized volume (cubic feet)

F. Truss attach points (number)

G. Experiment Module Exposed Facility attach points (number)

H. Experiment Logistics Module Exposed Section attach points (number)

ALLOCATION

The portioning of resources and accommodations to the ISS users. Total ISS resources and accommodations are allocated between system and utilization. Utilization resources and accommodations are allocated between IPs.

ASSEMBLY PHASE

Refers to the time period starting with First Element Launch (FEL) and ending with the landing of the last flight in the assembly sequence.

CARGO CARRIER

Element of a transportation vehicle that provides capability to carry cargo.

CHECKOUT

To ensure that the rack performs its intended functions with respect to data, power, Thermal Control System (TCS), etc.

CONSOLIDATED OPERATIONS AND UTILIZATION PLAN

The strategic document that defines the system and utilization activities planned for the ISS. On a planning period basis, it establishes the amount of resources and accommodations allocated to and subscribed by system and each International Partner for utilization, and reflects the planned amounts of supporting services from other Programs that are available and subscribed. The Consolidated Operations and Utilization Plan also provides specific direction and guidance to tactical planning regarding Consolidated Operations and Utilization Plan implementation.

CONTINGENCY EXTRAVEHICULAR ACTIVITY

An unplanned EVA required to support the safe return of the vehicle and crew and/or restore critical systems/functions.

CREW DAYS IN SPACE

The time period from launch of a crew rotation vehicle to landing of the vehicle which returns that crew.

CREW DAYS ON THE ISS

The time period from docking of a crew rotation vehicle to undock of the vehicle which returns that crew.

EXECUTION PLANNING

The planning that occurs 18 months before the start of an increment through real-time operations.

FLIGHT

For Shuttle flights, the term “Flight” refers to the sequence of events that takes place between the lift-off and landing of the Shuttle. For permanent Russian Elements flights, the term refers to the sequence of events that takes place between the lift-off of the element through completion of docking to the ISS. For replaceable IP Element flights, the term refers to the sequence of events that take place between lift-off and entry/landing of the element.

HARD COMMIT

Amount of resources allocated to utilization based on specified ISS Program system capabilities.

INCREMENT

(Also known as Expedition.) A specific time period which combines different operations such as assembly, scientific research, testing, logistics, maintenance, and other ISS system and utilization operations. The initial unmanned timeframe and subsequently, the timeframe of each crew expedition. During the assembly phase, an increment is defined as a period supporting crew rotation. The duration of an increment is the time period from the launch of a designated Expedition crew to the undocking of the return vehicle for that Expedition crew.

INSTALL

Complete the structural attachment and, if applicable, connect utilities.

INTEGRATED TRUSS SEGMENT

An un-pressurized structural element of the ISS that includes ground-installed electrical, thermal, communications, command, and data components. Examples are Zenith (Z)1 and Starboard (S)0.

INTERNATIONAL PARTNER

Denotes the international space agencies that are jointly involved in the development of the ISS. These agencies include the Canadian Space Agency (CSA), European Space Agency (ESA), NASA, Japan Aerospace Exploration Agency (JAXA), and Federal Space Agency (Roscosmos).

JETTISON

The intentional manual release of an object during an EVA such that the object safely separates from ISS and eventually re-enters through earth's atmosphere. Jettisons may be planned, to achieve waste disposal or scientific objectives, or in response to a contingency, such as inability to install or safely stow or return an item.

KU-BAND

The Ku frequency band is 12 - 18 Gigahertz (GHz), and the frequencies used by the ISS Ku-band subsystem for uplink is 13.775 GHz and downlink is 15.0034 GHz.

LAUNCH VEHICLE

A Booster vehicle that delivers the transportation vehicle from the launch pad to an insertion orbit in low earth orbit (Proton, Soyuz, Ariane 5, or HII for example).

NONRECOVERABLE CARGO

Cargo that is designated as cargo that will either be destroyed upon reentry or when it is returned to Earth (e.g., Shuttle/ISS trash).

OBJECTIVES

High-level goals that do not specify any particular activity. For an IDRD, each increment will have objectives. During assembly, the main system objectives are building, activating, and supporting the ISS. Examples of utilization objectives during assembly are installing and activating research facility racks, and performing research operations.

PLANNING PERIOD

Approximately one calendar year of ISS activity. A planning period is comprised of one or more increments.

RACK VOLUME EQUIVALENT

A unit of volume that equals 36.0 cubic feet or 1.0193 cubic meters.

RECOVERABLE CARGO

Cargo that is removed from the ISS and returned to Earth to be refurbished for future use, samples for evaluation, or items to be examined as part of sustaining engineering.

RESOURCES

Identifies a particular subset of ISS on-orbit capabilities used in support of system and utilization operations. It includes the following:

A. Average power kW

B. Crew time (hours)

C. Communications

D. On-orbit accommodations (pressurized and unpressurized)

E. Transportation Mass

F. Transportation Volume

S-BAND

1550 to 5200 Megahertz

SCHEDULED EXTRAVEHICULAR ACTIVITY

An EVA planned prior to the start of an increment or flight/stage with nominal crew training and included in the nominal mission timeline.

SHORT DURATION BIOASTRONAUTICS INVESTIGATION

A medical research payload that will be flown and returned in a pressurized volume on the same Shuttle flight, involves a Shuttle (non-ISS) crewmember(s) as the test subject, and does not require any ISS resources (e.g., ISS crew time, ISS power, ISS communications) to accomplish the research objective. Responsibility for manifesting and prioritizing Short Duration Bioastronautics Investigations (SDBIs) with respect to the other ISS payloads resides with the ISS Payloads Office. However, responsibility for planning SDBI activities and resources during the mission, as well as (CoFR) for the SDBIs, resides with the Space Shuttle Program and will be accomplished in accordance with Space Shuttle Program processes and procedures.

SOFT COMMIT

Amount of resources estimated to be available to utilization based on either estimated capabilities above specified conditions/assumptions, a reduction of system reserves, or both.

STAGE

Period of on-orbit configuration of the ISS after each flight which adds capability to the ISS. This can also refer to a designated period between launch vehicles defined by the ISS Program for requirement documentation and planning purposes.

SYSTEMS

A group of H/W that collectively supports or provides capabilities to the orbiting ISS. In general, anything other than utilization. Specifically included in this set are assembly, logistics/maintenance environmental support, power, etc.

TASK-TYPE DESIGNATOR

Identifies categories for mission task requirements and include: [Extravehicular Activity (EVA)], [Intravehicular Activity (IVA)], [Robotics], [Robotic On-Board Trainer (ROBoT)], [Utilization], [Ground], [Jettison], [Imagery].

TRANSFER

To remove H/W and/or provisions from one vehicle or module and place onto another vehicle or module.

TRANSFER VEHICLE

A transportation vehicle that provides capability to move mass and volume from the insertion orbit to ISS and from ISS to reentry.

TRANSPORTATION VEHICLE

A vehicle that docks to the ISS to deliver provisions, cargo, and/or crew for ISS operations.

UNSCHEDULED EXTRAVEHICULAR ACTIVITY

An EVA resulting from unforeseen developments during a mission and not included in the nominally scheduled mission activities, but which may be required to achieve ISS Program mission success.

USOS (UNITED STATES ON-ORBIT SEGMENT)

Term that generically describes ISS hardware and software systems manufactured and installed on-orbit by NASA. Within this document, examples of USOS include the truss solar arrays for the generation of power and the Joint Airlock, Extravehicular Mobility Unit (EMU) suit, tools and associated hardware for NASA based EVAs.

UTILIZATION

The set of requirements associated with research experiment integration and operation.

VALIDATION

The process of formally approving the developed process, services, or products at the conclusion of operational test and evaluation. This approval indicates developed processes, services, or products satisfy their intended operational mission.

VERIFICATION

The activities which assure that each level of requirements (including test requirements) or specifications correctly echoes the intentions of the immediately superior level of requirements.

APPENDIX C - OPEN WORK

Table C-1 lists the specific TBD items in the document that are not yet known. The TBD is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBD item is numbered based on the section where the first occurrence of the item is located as the first digit and a consecutive number as the second digit (i.e., **<TBD 4-1>** is the first undetermined item assigned in Section 4 of the document). As each TBD is solved, the updated text is inserted in each place that the TBD appears in the document and the item is marked "Closed" in the status column. As new TBD items are assigned, they will be added to this list in accordance with the above described numbering scheme. Original TBDs will not be renumbered and the same TBD number cannot be used more than once. NOTE: TBDs incorporated into this document via the IDRD Flight Program will be preceded by "FP" (i.e. **<FP TBD 3-*XX*>**).

TABLE C-1 TO BE DETERMINED ITEMS

TBD	Section	Description	Status
1-1	1.2, Table 3.3-1	Timing of the return flight for E17/18 FE-2 (ULF2) is dependant upon the baselining of the Flight Program definition for Increment 18.	Open
1-2	1.2	SSP 54018 has not been published.	Open
1-3	1.2	Data in work. To be baselined in IDRD for Flight Program.	Closed
1-4	1.2, 2.1	SSP 54017-16S has not been published.	Open
1-5	1.2, 2.1	SSP 54017-1J has not been published.	Open
1-6	1.2, 2.1	SSP 54017-29P has not been published.	Open
1-7	1.2, 2.1	SSP 54016-ATV1 has not been published.	Open
1-8	1.2, 2.1	SSP 54017-30P has not been published.	Open
1-9	1.2, 2.1	SSP 54017-31P has not been published.	Open
1-10	1.2, 2.1	SSP 54017-ULF2 has not been published.	Open
1-11	1.2, 2.1	SSP 54017-ANX 2 has not been published.	Open
1-12	1.2, 2.1	SSP 54017-ANX 3 has not been published.	Open
1-13	1.2, 2.1	SSP 54017-ANX 4 has not been published.	Open
1-14	1.2, 2.1, Table 3.3-1, 4.0, 4.1, 4.2, 4.5, 6.2, 6.4.2	SSP 54017-ANX 5 has not been published.	Open
2-1	2.2	SSP 54316 has not been published.	Open
3-1	Table 3.2-1, Table 3.3-1	Date of the 16 Soyuz relocation from the DC1 Nadir port to the FGB Nadir port is not yet defined.	Open
3-2	Table 3.3-1	Crew assignment to be determined.	Open
3-3	Table 3.3-1	E17/18 FE-2 (ULF2) returns in the strategic time frame.	Open
3-4	6.6.2, 6.6.3.3, 6.6.3.9	ATV undocking constraints have yet to be fully determined.	Open
3-5	Table 3-3.1, 6.7.2	Unscheduled remaining objectives to be determined post 10A.	Open
3-6	Table 3.3-1, 6.5.2, 6.5.7	Currently listed as a manifest candidate.	Open
3-7	3.4	Rationale and Risk Mitigation are in work and will be provided in the next	Open

TBD	Section	Description	Status
		CR.	
3-8	Table 3.3-1, 6.7.7	Manifest and Crew Time assessment to be confirmed.	Open
4-1	Table 4.2-1	Crew time Allocation is not yet defined.	Closed
4-2	Table 4.2-1	RSOS Utilization requirement is not yet defined.	Open
4-3	Table 4.3-1	FGB volume and RVE equivalent after installation of new enclosures is to be determined.	Closed
4-4	Table 4.5-1	Additional resource “total amount of usage” has not been determined.	Open
4-5	Table 4.1-1	Power analysis does not include ATV1 loads.	Open
5-1	Table 5.0-1	Mass and Volume to be provided at a later date.	Open
5-2	Table 5.0-1	Flight 1J ascent/descent cargo and consumables transfer allocations are not fully defined.	Open
6-1	6.2.1, 6.2.2	List of Russian and Visiting Crew Member Experiments will be provided at a later date.	Open
6-2	6.3.2	Pending official receipt of Visiting Crew operations tasks.	Open
6-3	6.4.2	Due to Potential very short 16S Stage, some of these tasks may be completed during Increment 16.	Open
6-4	6.4.2, 6.6.2, 6.8.2	Crew Time Allocations are not yet defined.	Open
6-5	6.5.2	Pending assessment of ability to do reconfiguration during stage.	Closed
6-6	6.5.2	Prioritization of utilization tasks vs. JEMRMS checkout is inconsistent with GGR&C.	Open
6-7	6.6.2	Work site number is not defined at this time.	Open
6-8	6.6.2	Possible relocation pending assessment of alternate EXPRESS rack installation.	Open
6-9	6.6.2	Rack relocation priority is to be determined.	Open
6-10	6.6.2	Checkout tasks not defined at this time.	Open
H-1	6.4.2, 6.5.2, 6.6.2, 6.8.2	On-orbit Checkout Requirements will be provided at a later date.	Open
I-1	6.5.2, Appendix I	Transfer Priority List is undefined.	Open
K-1	6.3.2, Appendix K	To be provided at a later date.	Open

Table C-2 lists the specific TBR issues in the document that are not yet known. The TBR is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBR issue is numbered based on the section where the first occurrence of the issue is located as the first digit and a consecutive number as the second digit (i.e., **<TBR 4-1>** is the first unresolved issue assigned in Section 4 of the document). As each TBR is resolved, the updated text is inserted in each place that the TBR appears in the document and the issue is marked “Closed” in the status column. As new TBR issues are assigned, they will be added to this list in accordance with the above described numbering scheme. Original TBRs will not be renumbered and the same TBR number cannot be used more than once. NOTE: TBRs incorporated into this document via the IDRD Flight Program will be preceded by “FP” (i.e. **<FP TBR 3-*XX*>**).

TABLE C-2 TO BE RESOLVED ISSUES

TBR	Section	Description	Status
FP 3-8	Table 3.2-1, Table 3.3-1, 6.6, 6.6.2, 6.6.3.2, 6.6.3.4, 6.6.3.5, 6.6.3.6, 6.8, 6.8.2, 6.8.3.1	Russian Flight Program is under review.	Open
FP 3-38	Table 3.2-1, Table 3.3-1, 6.6.2, 6.6.3.3	ATV1 undock date will be determined pending Port Utilization analysis to maximize ATV1 and factor checkout completion and propellant resources.	Open
3-1	Table 3.3-1	Identification of Utilization versus Systems activities for Kibo Module and Payload Facility Rack commissioning still pending further discussion on Kibo commissioning plan.	Open
4-1	Table 4.2-1	Crew time will be adjusted upon approval of the Russian Flight Program.	Open
4-2	Table 4.2-1	Crew time will be adjusted when the rack relocation activities are better defined.	Open
6-1	6.4.4.2	Task is not currently certified due to hardware unavailability and immature repair methodology.	Closed
6-2	6.8.2	Determination if PVCA software transition can be performed in Stage ULF2 or in Stage 17S is under review.	Open
6-3	6.5.2	Pending MOD EVA pool runs to determine if this activity will fit in the EVA3 timeline.	Open
6-4	6.5.2	Pending MOD EVA pool runs to determine if this activity will fit in the EVA1 timeline.	Open
6-5	6.5.5.1	Program approval pending EVA hardware Jettison options for 1J Flight.	Open
6-6	6.6.2	The addition of the installation of the VSC Thermal Cover to RS EVA #20 is to be resolved.	Open
6-7	6.5.2	Priority of the task to configure Columbus for JEM installation is pending ESA engineer assessment.	Open
D-1	6.6.2, Appendix D	WHC bump-out intrudes into CEVIS operational volume. CEVIS final location needs to be determined.	Open
J-1	Appendix J	The use of Appendix J is under review by OC Management.	Open

APPENDIX D - TOPOLOGIES

D.1 GENERAL

This appendix provides an overview of the internal on-orbit topologies for Node 1, Node 2, the U.S. Lab, the Joint Airlock, Columbus, JLP and JPM. Figures are included for each planned change of rack locations.

D.2 ON-ORBIT RACK DESCRIPTIONS

Table D.2-1, On-Orbit Rack Descriptions, shows the description of the rack represented by each rack Sub-Element (SE) number in the topologies contained in this appendix.

TABLE D.2-1 ON-ORBIT RACK DESCRIPTIONS

Rack SE#	Rack Description
2	US Lab CCAA/Low Temperature TCS
3	US Lab CCAA/Moderate Temperature TCS
4	US Lab Avionics 1/Condensate H_2O
5	US Lab Avionics 2
6	US Lab Avionics 3
7	US Lab DDCU #1
8	US Lab ARS
9	US Lab DDCU #2
11	US Lab MSS Avionics and Console/Storage
12	Cupola MSS Avionics and Console/Storage
13	NASA ISPR: HRF Rack #1
14	NASA ISPR: EXPRESS Rack #1
15	NASA ISPR: EXPRESS Rack #2
16	NASA ISPR: EXPRESS Rack #3
17	NASA ISPR: EXPRESS Rack #4
18	NASA ISPR: MSG
21	CIR (PaRIS)
23	NASA ISPR: EXPRESS Rack #5
25	MELFI
27	TESS
28	US Lab Temporary CHeCS
31	CHeCS 2 (ZSR)
45	TRDML #2
60	Crew Quarters
62	Crew Quarters
63	Crew Quarters
110	ZSR
111	ZSR
112	ZSR
113	ZSR

Rack SE#	Rack Description
116	ZSR
117	ZSR
118	ZSR
120	ZSR
122	ZSR
155	RSR
156	RSR
191	Airlock Stowage Platform - Overhead
192	Airlock Stowage Platform - Deck
193	Airlock Cabin Air Equipment Rack
194	Airlock Avionics Rack
301	DDCU
302	DDCU
303	DDCU
304	DDCU
313	OGS
315	WRS1
316	WRS2
317	WHC **<TBR D-1>**
318	NASA ISPR: EXPRESS Rack #6 (includes GALLEY)
351	DMS1
352	DMS2
353	JRSR-1
355	RMS
356	ECLSS/TCS1
357	ECLSS/TCS2
358	EPS1
359	EPS2
360	ICS/PROX
362	W/S
364	RYUTAI
365	SAIBO
381	U.S. Stowage Rack
400	Columbus System
411	EDR
412	FSL
413	EPM
414	BIO LAB
415	ETC
417	NASA ISPR: HRF Rack #2

D.3 FLIGHT AND STAGE RACK MOVES

This table summarizes the rack traffic during the Increment's flights and stages. Note that for prioritization order please refer to Section 6.0 for corresponding rack move tasks.

TABLE D.3-1 FLIGHT AND STAGE RACK MOVES

Flight and Stage Topology File	Racks Ups		Rack Moves			Racks Down	
	Name	Location	Name	Location 1	Location 2	Name	Location
Stage 16S	N/A	N/A	NONE			N/A	N/A
Flight 1J	DMS2 ECLSS/TCS2 EPS2 ECLSS/TCS1	JPM1O1 JPM1D6 JPM1D5 JPM1D1				None	
			DMS1 W/S RMS EPS1 RYUTAI SAIBO ICS/PROX JRSR-1	JLP1P2 JLP1A1 JLP1F1 JLP1S2 JLP1F2 JLP1A2 JLP1P1 JLP1S1	JPM1O5 JPM1F4 JPM1A6 JPM1D2 JPM1A3 JPM1A2 JPM1O4 JPM1O3		
Stage 1J	N/A	N/A	EXPR #4 EXPR#5 CHeCS 1 HRF #2 HRF #1 MELFI-1 ZSR ZSR	LAB1P2 LAB1S4 LAB1D4 LAB1P4 LAB1S2 LAB1O4 LAB1O5 NOD2D5	JPM1F5 JPM1F1 LAB1S4 COL1A4 COL1F4 JPM1D4 JPM1F6 JLP1P1	N/A	N/A
Flight ULF2 **<TBR D-1>**	CHeCS 2 (ZSR) EXPR #6 (includes Galley) WRS2 WHC WRS1 CIR (PaRIS) TRDML 2 Crew Qtrs Crew Qtrs ZSR Crew Qtrs	LAB1O5 LAB1O4 LAB1P4 LAB1P2 LAB1D4 LAB1S3 NOD2D5 NOD2P5 NOD2S5 JLP1P2 JPM1A5				RSR RSR	NOD2P5 NOD2S5
Stage ULF2	N/A	N/A	NONE			N/A	N/A

D.4 FLIGHT/STAGE 16S TOPOLOGY

Figure D.4-1, Flight/Stage 16S Topology, shows a high level overview of the on-orbit topology at the beginning of the increment. Refer to Table D.2-1 for a definition of the rack SE numbers.

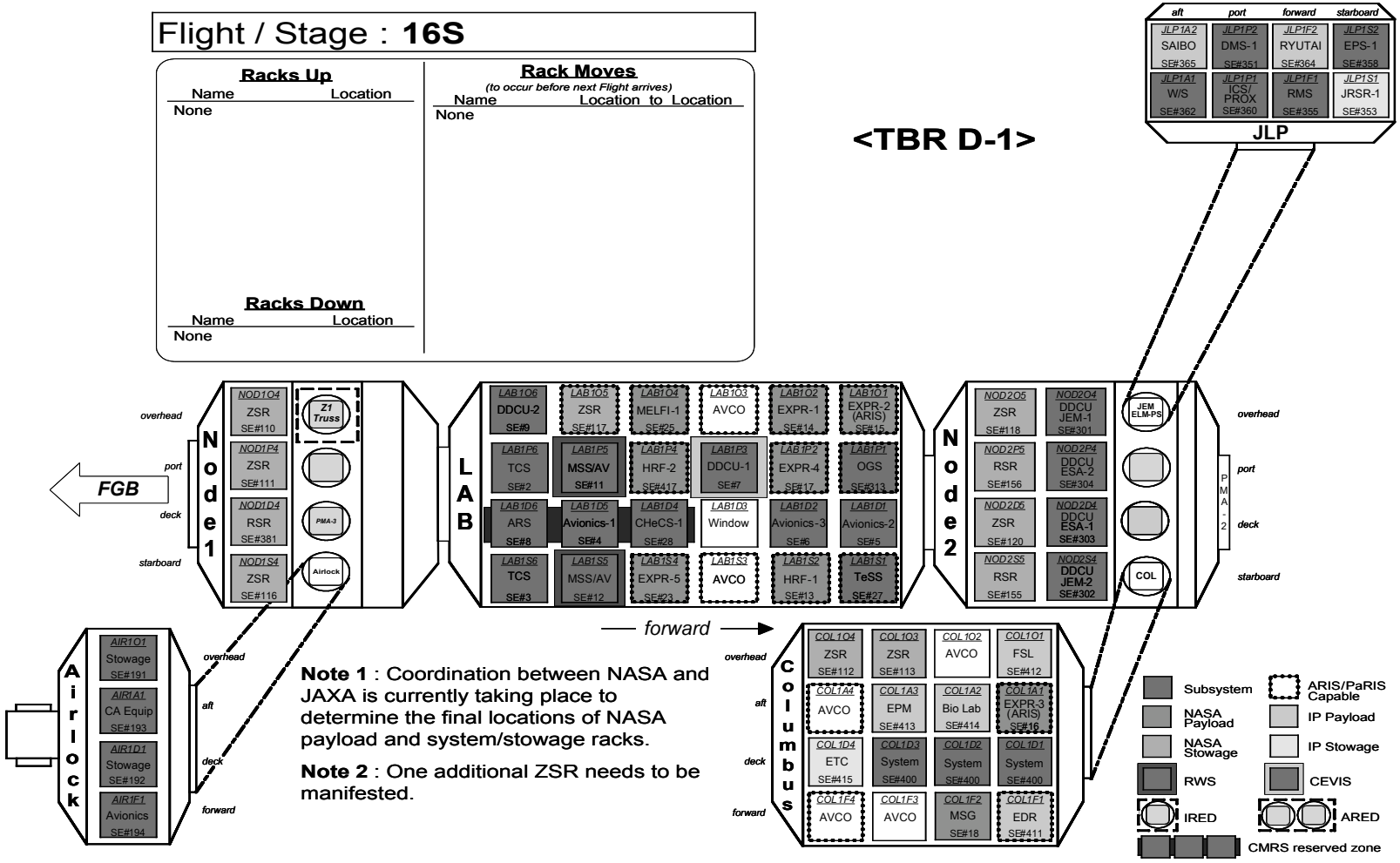

FIGURE D.4-1 FLIGHT/STAGE 16S TOPOLOGY

D.5 FLIGHT/STAGE 1J TOPOLOGY

Figure D.5-1, Flight/Stage 1J Topology, shows a high level overview of the 1J on-orbit topology. Refer to Table D.2-1 for a definition of the rack SE numbers.

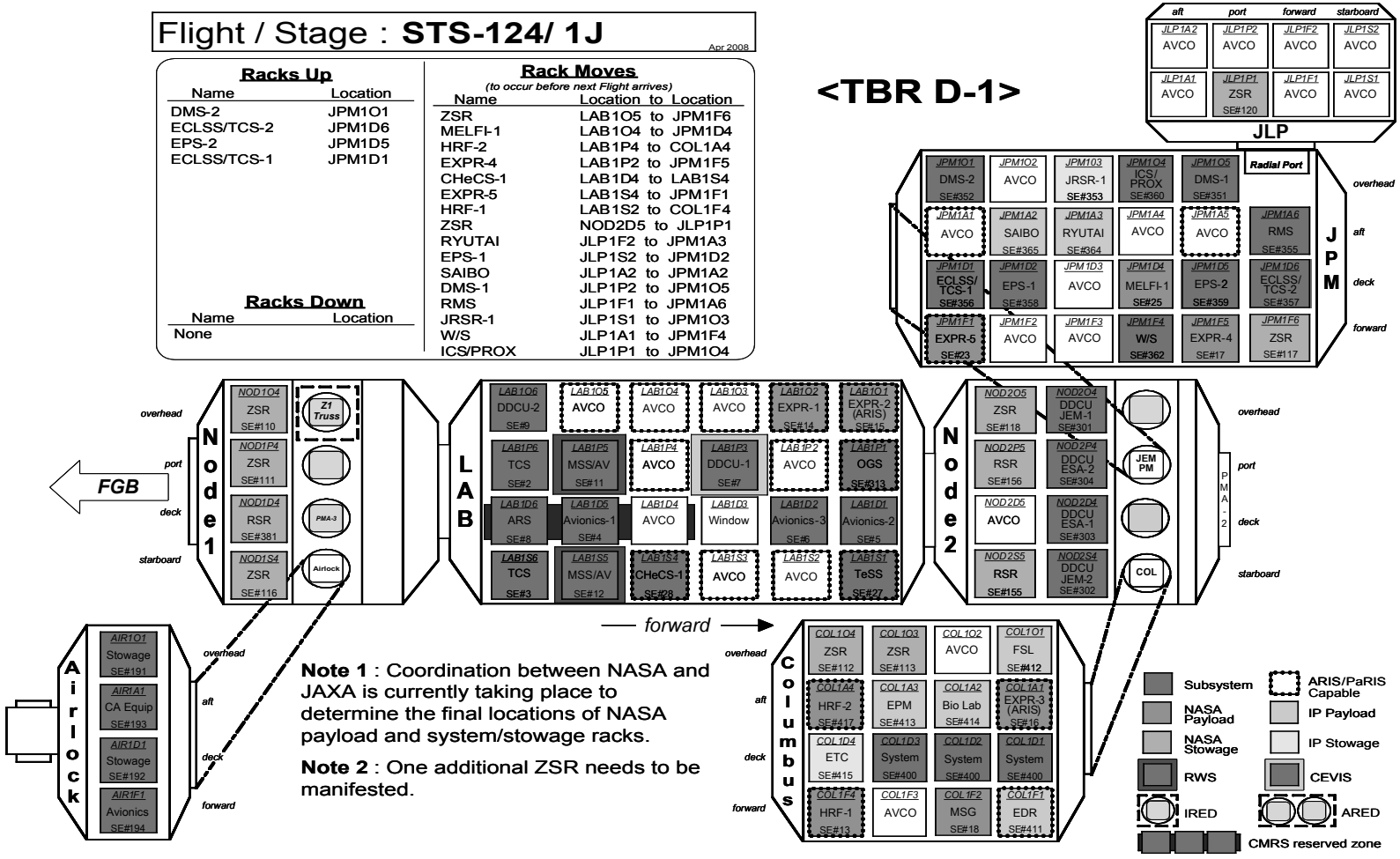

FIGURE D.5-1 FLIGHT/STAGE 1J TOPOLOGY

D.6 FLIGHT/STAGE ULF2 TOPOLOGY

Figure D.6-1, Flight/Stage ULF2 Topology, shows a high level overview of the ULF2 on-orbit topology. Refer to Table D.2-1 for a definition of the rack SE numbers.

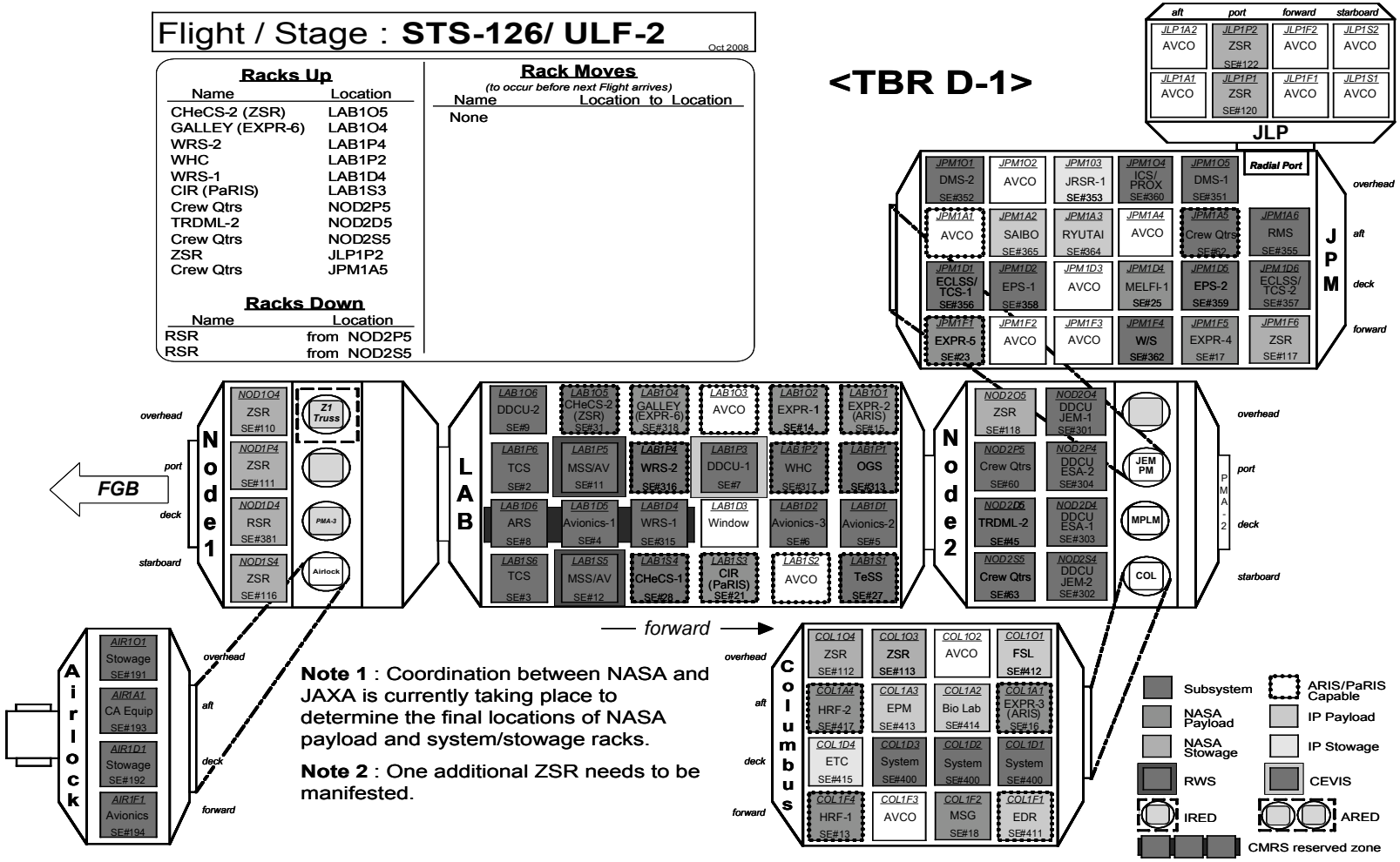

FIGURE D.6-1 FLIGHT/STAGE ULF2 TOPOLOGY

APPENDIX E - INCREMENT CONFIGURATIONS

The configuration plans for flight and stage are in JSC 26557, On-orbit Assembly, Modeling, and Mass Properties Data Book, also known as Blue Book, accessible through Electronic Document Management System (EDMS).

APPENDIX F - <DELETED>

APPENDIX G - <DELETED>

APPENDIX H - ON-ORBIT CHECKOUT REQUIREMENTS

[No Russian Review Required]

Appendix H contains a listing of those MSS OCRs that can be completed during this increment. All tables have been scrubbed to eliminate completed OCRs or OCRs that cannot be accomplished within this increment. Table H-1 Part 1 of this plan contains SSRMS OCRs from the previous increment not completed and carried forward. Table H-2 contains MBS OCRs. Table H-3 contains MSS Periodic checkout tasks due for completion within this increment. Table H-4.A contains the remaining SPDM Commissioning OCRs from Increment 16 which allows the second phase of SPDM Initial Commissioning Complete**. Table H-4B contains the Increment 17 OCRs for SPDM Commissioning Complete.

*** NOTE: Table H-4A below is a copy of Increment 16 IDRD's Table H-4B which contained all the 1J/A Flight or Stage OCRs that could be performed to further advance SPDM Commissioning during the increment. If any of these OCRs were executed during the Increment 16 stage they are not required to be re-executed during Increment 17. They can be removed or checked off as completed.*

TABLE H-1 SSRMS ON-ORBIT CHECKOUT REQUIREMENTS

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	
N/A										

TABLE H-2 MRS BASE SYSTEM ON-ORBIT CHECKOUT REQUIREMENTS

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	
N/A										

TABLE H-3 PERIODIC ON-ORBIT CHECKOUT REQUIREMENT TASKS

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
N/A										

SPDM OCRs

The first phase **(Deployment Complete)** was completed during STS-123 (ISS 1J/A) flight and 1J/A Stage Operations.

The second commissioning phase is: **2**) **Initial Commissioning Complete** which requires commissioning of all fundamental SPDM functionality, connectivity, and hazard controls in order to enable use of SPDM for EVA support (e.g. Flight Releasable Attach Mechanism (FRAM) Ops). Note that Tool OCRs are included in this phase as they are the most efficient means of achieving the initial SPDM commissioning objectives. Phase 1 and 2 OCRs are listed in Table H-4.A.

This Increment (Increment 17) includes SPDM OCRs that could be performed that will contribute to the third and final phase of SPDM commissioning, i.e.: **3**) **Fully Commissioned**. Those OCRs listed as Highly Desirable for Inc 16 are those required to enable use of SPDM for autonomous external maintenance (e.g. MT Stop, Tether Shuttle Stop and ORU R&R). OCRs related to Cargo Transport Container (CTC) and Enhanced OEU & Tool Platform (EOTP) Ops are not feasible in this Increment and are not yet included in this release of Table H-4.B.

With respect to Ground commanding and control capability, captured in the Ground Option column as YES items are those MSS functions currently approved for ground commanding and generically applicable to SPDM, i.e. safing, power commands, and camera operations. Those OCRs involving a current SPDM ground commanding capability that has yet to be approved and commissioned on-orbit are highlighted as such. The categories are: Following *Unloaded* SPDM Gas Chromatograph (GC) Commissioning, Following SPDM GC *Contact Ops* Commissioning, and Following SPDM GC *Loaded* Ops Commissioning. *Unloaded* SPDM Ground Control includes unloaded: body and arm free space motion. It is expected to be ready for commissioning at 1J/A with constraints identified. SPDM GC *Contact* Ops is limited to proximity or contact ops with fixed or fastened hardware such as: stabilization fixture, fastened tool or ORU. SPDM GC *Loaded* Ops includes manipulation of tools or ORUs.

OCR's which contain " * " at the beginning of the Task Number represent OCR's which verify Hazard Controls within the SPDM ETE Hazard Reports.

TABLE H-4.A REMAINING SPDM INCREMENT 16 ON-ORBIT CHECKOUT REQUIREMENTS

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
*** OCRs Required for Initial Commissioning Complete ***										
Power OCRs										
* OCR PWR 7.3 055 7.4 056	SPDM PDGF Channel A & B (MLB)	Verifies that the SPDM can be operated while positioned on the MLB via the PDGF on Channel B	X			Inc 16	Prior to Deployment Complete	Prior to R&R & 2J/A Operations	2 min	YES
OCR PWR 10.1 068 10.2 069	SPDM Shutdown OTCM1 & OTCM2	Verifies the SPDM Arm1 & Arm2 OEUs can be commanded to power off.	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	5 min each	YES
OCR PWR 10.3 070 10.4 071	SPDM Startup OTCM1 & OTCM2	Verifies the SPDM Arm1 & Arm2 OEUs can be commanded to startup again after a shutdown	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	10 min each	YES
PWR 14.1 082	SPDM BDU Shutdown on Primary	Verifies the BDU can be powered off using the Primary string.	X			Prior to Deployment Complete	Inc 16	Prior to OTCM Operations	5 min	YES
PWR 14.2 083	SPDM BDU Startup Primary	Verifies the BDU can be powered on using the Primary string.	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	10 min	YES
PWR 14.3 084	SPDM BDU Shutdown on Redundant	Verifies the BDU can be powered off using the Redundant string.	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	5 min	YES
PWR 14.4 085	SPDM BDU Startup on Redundant	Verifies the BDU can be powered on using the Redundant string.	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	10 min	YES
OCR PWR 14.1 082 14.2 083	SPDM BDU Shutdown – Primary/Redundant	Verifies that the SPDM BDU can be shutdown	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	5 min	YES
OCR PWR 14.3 084 14.4 085	SPDM BDU Startup Primary/Redundant	Verifies that the SPDM BDU can be Started up again	X			Prior to Deployment Complete	Inc 16	Prior to SPDM OTCM Operations	10 min	YES

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
* OCR PWR 7.7 059 7.8 060	SPDM LEE Channel A & Channel B (PLB)	Verifies that the SPDM can be operated while positioned on the PLB via the LEE on Channel A & Channel B	X			Inc 16		Prior to R&R Operations	2 min each	YES
OCR PWR 11.1 072	SPDM Shutdown Body Joint (Primary)	Verifies the SPDM Primary Body Joint (BJEU2) can be powered off	X			Inc 16		Prior to OTP or THA to Operations	5 min	YES
OCR PWR 11.2 073	SPDM Shutdown Body Joint (Redundant)	Verifies the SPDM Redundant Body Joint (BJEU1) can be powered off	X			Inc 16		Prior to OTP or THA Operations	5 min	YES
OCR PWR 11.3 074	SPDM Startup Body Joint (Primary)	Verifies the SPDM Primary Body Joint (BJEU2) can be powered back on after a shutdown	X			Inc 16		Prior to OTP or THA Operations	10 min	YES
OCR PWR 11.4 075	SPDM Startup Body Joint (Redundant)	Verifies the SPDM Redundant Body Joint (BJEU1) can be powered back on after a shutdown	X			Inc 16		Prior to OTP or THA Operations	10 min	YES
OCR PWR 12.1 076	SPDM Shutdown SPDM Arm Joint	Verifies that an SPDM Arm Joint subunit can be shutdown	X			Inc 16		For R&R Operations	5 min	YES
OCR PWR 12.2 077	SPDM Startup SPDM Arm Joint	Verifies that an SPDM Arm Joint subunit can be powered back on after a shutdown	X			Inc 16		For R&R Operations	10 min	YES
Body Joint OCRs										
OCR BJEU 5.2 008	SPDM BJEU Servo Brake Checkout for an Unloaded Primary Body Joint PDGF End	Verifies the SPDM Primary Body joint responds to a “Null” input by successfully applying the servo brakes.	X				1J/A Flight (Prior to Orbiter Departure)	For SPDM Body Joint Operations	5 min	Following Unloaded SPDM GC Commiss.
OTCM OCRs										
* OCR OTCM 1.1 001 1.2 002	SPDM OTCM1 & OTCM2 Diagnostic Tests	Verifies the proper functionality of the motor drive, and motor interface of the SPDM OTCM1 & OTCM2 mechanisms	X			Prior to Deployment Complete	Inc 16	Prior to OTCM Operations	5 min each	YES
OCR OTCM 2.3 005 2.6 008	SPDM OTCM1 & OTCM2 Gripper Calibration	Verifies the SPDM OTCM1 & OTCM2 Calibration of the Gripper Mechanism	X			Prior to Deployment Complete	Inc 16	Prior to OTCM Operations	5 min each	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR OTCM 2.4 006 2.7 009	SPDM OTCM1 & OTCM2 Umbilical Calibration	Verifies the SPDM OTCM1 & OTCM2 calibration of the umbilical mechanism	X			Prior to Deployment Complete	Inc 16	Prior to CTC Operations	5 min each	Following Unloaded SPDM GC Commiss.
* OCR OTCM 3.1 011 3.2 012	SPDM OTCM1 & OTCM2 Checkout	Verifies the SPDM all the OTCM1 & OTCM2 mechanisms are operating correctly	X			Prior to Deployment Complete	Inc 16	Prior to OTCM Operations	15 min each	Following Unloaded SPDM GC Commiss.
* OCR OTCM 4.1 021	SPDM OTCM Automatic Micro – Position Termination	Verifies an Auto Grip command using a Position Termination criteria on a micro fixture	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 4.2 022	SPDM OTCM Automatic Micro – Current Termination	Verifies an Auto Grip command using Current Termination on a micro fixture	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 4.3 023	SPDM OTCM Automatic H – Position Termination	Verifies an Auto Grip command using Position Termination on an H-Fixture.	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 4.4 024	SPDM OTCM Automatic H – Current Termination	Verifies an Auto Grip command using Current Termination on an H-Fixture	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 4.5 025	SPDM OTCM Automatic Other – Position Termination	Verifies an Auto Grip command using Position Termination on an undefined fixture	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 4.6 026	SPDM OTCM Automatic Other – Current Termination	Verifies an Auto Grip command using Current Termination on an undefined fixture	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 4.7 027	SPDM OTCM Automatic Advance	Demonstrates that an SPDM OTCM is able to perform an advance maneuver automatically.	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following Unloaded SPDM GC Commiss.
* OCR OTCM 4.8 028	SPDM OTCM Automatic Retract	Demonstrates that an SPDM OTCM is able to perform the retract maneuver automatically.	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
* OCR OTCM 4.11 031	SPDM OTCM Automatic Fasten	Demonstrates that an SPDM OTCM is able to perform a fasten maneuver automatically	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following Unloaded SPDM GC Commiss.
* OCR OTCM 4.12 032	SPDM OTCM Automatic Unfasten	Demonstrates that an SPDM OTCM is able to perform an unfasten maneuver automatically	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following Unloaded SPDM GC Commiss.
* OCR OTCM 5.1 033	SPDM OTCM Manual Micro – Position Termination	Demonstrates that an SPDM OTCM can perform a manual grip command on a micro-fixture using position termination.	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.2 034	SPDM OTCM Manual Micro – Current Termination	Demonstrates that an SPDM OTCM can perform a manual grip command on a micro-fixture using current Termination.	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.3 035	SPDM OTCM Manual H – Position Termination	Demonstrates that an SPDM OTCM can perform a manual grip command on an H-Fixture using position termination	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.4 036	SPDM OTCM Manual H – Current Termination	Demonstrates that an SPDM OTCM can perform a manual grip command on an H-Fixture using current termination	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.5 037	SPDM OTCM Manual Other – Position Termination	Demonstrates that an SPDM OTCM can perform a manual grip command on an undefined fixture using position termination	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.6 038	SPDM OTCM Manual Other – Current Termination	Demonstrates that an SPDM OTCM can perform a manual grip command on an undefined fixture using current termination	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	10 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.7 039	SPDM OTCM Manual Advance	Demonstrates the SPDM OTCM manual advance command in preparation for fastening bolts	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following Unloaded SPDM GC Commiss.
* OCR OTCM 5.8 040	SPDM OTCM Manual Retract	Demonstrates the SPDM OTCM manual retract command in preparation for unfastening bolts	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
* OCR OTCM 5.11 043	SPDM OTCM Manual Fasten	Demonstrates the SPDM OTCM manual fasten command for fastening bolts	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 5.12 044	SPDM OTCM Manual Unfasten	Demonstrates the SPDM OTCM manual unfasten command for unfastening bolts	X			Prior to Deployment Complete	Inc 16	For OTCM Operations	5 min	Following SPDM GC Contact Ops Commiss.
* OCR OTCM 3.3 013 3.6 016	SPDM OTCM1 & OTCM2 Gripper Checkout	Verifies the SPDM checkout of the OTCM1 & OTCM2 Gripper mechanism	X			Inc 16		Prior to OTCM Operations	15 min each	Following Unloaded SPDM GC Commiss.
* OCR OTCM 3.4 014 3.7 017	SPDM OTCM1 & OTCM2 Umbilical Checkout	Verifies the SPDM checkout of the OTCM1 & OTCM2 Umbilical mechanism	X			Inc 16		Prior to CTC Operations	5 min each	Following Unloaded SPDM GC Commiss.
* OCR OTCM 3.5 015 3.8 018	SPDM OTCM1 & OTCM2 Advance Checkout	Verifies the SPDM Checkout of the OTCM1 & OTCM2 Advance mechanism	X			Inc 16		For OTCM Operations	5 min each	Following Unloaded SPDM GC Commiss.
FMS/FMA OCRs										
OCR SPDM FMS 4.1 007 FMS 4.2 008	SPDM FMS WR Characterization Arm 1(Arm 2)	This OCR is meant to verify that the Wrist Roll Joint motion does not interfere with the FMS sensor.	X			Prior to Deployment Complete	Inc 16	For FMS/FMA Contact Operations	10 min each	Following Unloaded SPDM GC Commiss.
OCR SPDM FMS 2.1 003 FMS 2.2 004	SPDM FMS Arm1 & Arm2 Dynamic Loads Test	Verifies the FMS measurements and assesses the accuracy using OTCM as load.	X			Prior to Deployment Complete	Inc 16	For FMS/FMA Contact Operations	60 min each	Following Unloaded SPDM GC Commiss.
OCR SPDM FMA 1.1 001 FMA 1.2 002	SPDM FMA Arm1 & Arm2 Grasping	Verifies that the SPDM Arm1 & Arm2 can successfully backdrive the arm during capture operations.	X			Prior to Deployment Complete	Inc 16	For FMS/FMA Contact Operations	10 min each	Following SPDM GC Contact Ops Commiss.
OCR SPDM FMA 3.1 005 3.2 006	SPDM FMA Arm1 & Arm2 ORUs Insertion / Extraction with Stabilization	Demonstrates that FMA on Arm 1& Arm2 can assist in ORU insertion and extraction operations with stabilization.	X				Inc 16	For FMS/FMA Contact Operations	70 min each	Following SPDM GC **Loaded Ops** Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR SPDM FMA 4.1 007 4.2 008	SPDM FMA Arm 1 & Arm2 Constrained Motion -- Stabilized	OCR demonstrated that the SPDM Arm1 & Arm2 can, with FMA enabled, successfully complete a constrained motion task.	X				Inc 16	For FMS/FMA Contact Operations	70 min each	Following SPDM GC Contact Ops Commiss.
OCR SPDM FMA 2.1 003 FMA 2.2 004	SPDM FMA Arm1 & Arm2 Bolt Following	OCR assess the FMA performance for bolt following operations on Arm1 & Arm2	X			Inc 16		For FMS/FMA Contact Operations	45 min each	Following SPDM GC **Loaded Ops** Commiss.
OCR SPDM FMA 3.3 009 FMA 3.4 010	SPDM FMA Arm1 & Arm2 ORU Insertion / Extraction without Stabilization	Demonstrates that FMA on Arm1 & Arm2 can assist in ORU insertion and extraction operations without stabilization	X			Inc 16		For FMS/FMA Contact Operations	60 min each	Following SPDM GC **Loaded Ops** Commiss.
Arm Joint OCRs										
* OCR SJEU 4.1 007 4.2 008	SPDM Arm1 & Arm2 Joint Limited Range Test	Verifies that each of the SPDM Arm1 & Arm2 joints can rotate in both directions	X			Prior to Deployment Complete	Inc 16	Prior to Stabilization / R&R Operations	30 min each	Following Unloaded SPDM GC Commiss.
OCR SJEU 6.3 013 6.4 014	SPDM Servo Brake Checkout for an Unloaded Arm1 & Arm2 with Stabilization	Verifies that each of the SPDM Arm1 & Arm2 respond to a “Null” input by successfully applying the servo brakes when unloaded with stabilization	X			Prior to Deployment Complete	Inc 16	For Stabilized SPDM Arm Operations	30 min each	Following Unloaded SPDM GC Commiss.
OCR SJEU 6.5 015 6.6 016	SPDM Servo Brake Checkout for a Loaded Arm1 & Arm2 with no Stabilization	Verifies that each of the SPDM Arm1 & Arm2 respond to a “Null” input by successfully applying the servo brakes when loaded with no stabilization	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	30 min each	Following Unloaded SPDM GC Commiss.
OCR SJEU 6.7 017	SPDM Servo Brake Checkout for a Loaded Arm1 & Arm 2 with Stabilization	Verifies that each of the SPDM Arm1 & Arm2 respond to a “Null” input by successfully applying the servo brakes when loaded with stabilization	X			Prior to Deployment Complete	Inc 16	For stabilized SPDM Arm Operations	30 min each	Following Unloaded SPDM GC Commiss.
OCR SJEU 7.3 056 7.4 057	SPDM Arm1 & Arm2 Joint Limp Commands	Verifies the SPDM Arm 1 & Arm2 joints can be commanded to limp and back to position hold.	X			Prior to Deployment Complete	Inc 16	Prior to R&R Operations	5 min each	YES

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR SJEU 9 023	SPDM SJEU – Pause, Resume, & Terminate	Verifies that the operator can pause, resume and terminate an autosequence	X			Prior to Deployment Complete	Inc 16		30 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 29 048	SPDM Shoulder Cluster Internal Collision Check	Verifies the ability of the system to put the active SPDM arm in position-hold-submode when approaching a shoulder cluster internal collision limit	X			Prior to Deployment Complete	Inc 16		60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 30 049	SPDM Wrist Cluster Internal Collision Check	Verifies the ability of the system to put the active SPDM arm in position-hold-sub-mode when approaching a wrist cluster internal collision limit.	X			Prior to Deployment Complete	Inc 16		60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 31 050	SPDM Cross Cluster Collision Check	Verifies that the SPDM detects the Cross Cluster Collision and responds correctly to it.	X			Prior to Deployment Complete	Inc 16		60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 13.1 041	SPDM Coarse/Vernier Rate Selection Static Rate	Verifies the operator can select the coarse/vernier maximum static rate for SPDM movement.	X			Prior to Deployment Complete	Inc 16	For R&R Operations	60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 15 019	SPDM MAM Checkout	Verifies that the MAM control mode is working with the required accuracy and resolution	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 16 020 16.1 020	SPDM OCPM Checkout Arm1 & Arm2	Verifies that the OCPM control mode is working with the required accuracy and resolution	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min each	Following Unloaded SPDM GC Commiss.
* OCR SJEU 17 021	SPDM OCJM Checkout	Verifies the OCJM control mode is working properly with the required accuracy and resolution	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 21 026	SPDM BLOCS Coordinate Frame Checkout	Verifies the correct implementation of BLOCS frame for POR operations	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR SJEU 22 018	SPDM SOCS Coordinate Frame Checkout	Verifies the correct implementation of SOCS frame for POR operations	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 27.1 043	SPDM Line Tracking using Joint Tracking	Verifies that the Line Tracking feature is working properly to correct POR trajectory errors during POR movement along a straight line.	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 27.2 044	SPDM Line Tracking using POR Tracking	Verifies that the Line Tracking feature is working properly to correct POR trajectory errors during POR movement along a straight line.	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 28 035	SPDM Base Joint Locking	Verifies that the Base Joint Lock control feature is working properly for Shoulder roll or yaw	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	30 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 5.1 009 5.2 010	SPDM Arm1 & Arm2 Joint Full Range Test	Demonstrates that each of the SPDM Arm1 & Arm2 Joints can rotate through their full range of motion	X			Prior to Deployment Complete	Inc 16	For Unstabilized SPDM Arm Operations	60 min each	Following Unloaded SPDM GC Commiss.
OCR SJEU 5.1 009 5.2 010	SPDM Arm 1 & Arm2 Joint Full Range Test	Verifies each of the SPDM Arm1 & Arm2 Joints to their +/- soft stops	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min each	Following Unloaded SPDM GC Commiss.
OCR SJEU 8.1 021 8.2 022	SPDM Arm1 & Arm2 Limping Mode	Verifies that SPDM Arm1& Arm2 can operate in limp mode	X			Inc 16		For Unstabilized SPDM Arm Operations	5 min each	Following Unloaded SPDM GC Commiss.
* OCR SJEU 13.2 042	SPDM Coarse/Vernier Rate Selection “on-the-fly”	Verifies the operator can select the coarse/vernier maximum rate on the fly for SPDM movement	X			Inc 16		For R&R Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 9 023	SPDM SJEU – Pause, Resume, & Terminate	Verifies that the SPDM Arm can pause, resume and terminate an auto sequence	X			Inc 16		For Unstabilized SPDM Arm Operations	30 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR SJEU 10 024	SPDM POR Rate Limit Selection	Verifies that the operator is able to select SPDM POR translational and rotation rate limits	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 11 014	SPDM Rate Input Scale Selection	Verifies the operator is able to set the Vernier and Coarse rate scale factors between min and max values.	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 12 015	SPDM Rate Hold	Verifies the rate hold feature is able to hold the manipulator rate constant	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 18 022	SPDM PPAM Checkout	Verifies that the PPAM control mode is working with the required accuracy and resolution	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
* OCR SJEU 19 023	SPDM PJAM Checkout	Verifies that the PJAM control mode is working with the required accuracy and resolution	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 20.1 024	SPDM Hot Stick Position & Orientation Hold Selection	Verifies that the Hot Stick Position/Orientation Hold feature is working.	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 20.2 025	SPDM Manual Position & Orientation Hold Selection	Verifies that the Manual Position/Orientation Hold Feature is working.	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 23.1 028	SPDM Tip Speed Performance Test Min Joint Rate	Verifies SJRM mode with minimum rate command for Tip Speed performance recording	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 23.2 029	SPDM Tip Speed Performance Test Max Joint Rate	Verifies SJRM mode maximum rate command for Tip Speed performance recording	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 24 030	SPDM APPC	Verifies that the APPC control mode is working with the required accuracy and resolution	X			Inc 16		For Unstabilized SPDM Arm Operations	30 min	NO

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR SJEU 26.1 032	SPDM Singularity Management (6 DOF)	Verifies that the SPDM singularity management is working when using a 6 DOF configuration	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 26.2 033	SPDM Singularity Management (7 DOF)	Verifies that the SPDM singularity management is working when using a 7 DOF configuration	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 34 040	SPDM DJOPS Checkout	Verifies the arm can work in DJOPS when one joint is failed.	X			Inc 16		For Unstabilized SPDM Arm Operations	60 min	Following Unloaded SPDM GC Commiss.
Video OCRs										
OCR VID 5.1 005 5.2 006	SPDM Video OTVC#1 & OTVC#2 Full Checkout	Verifies OTVC#1 & OTVC#2 cameras features such as Near/Wide FOV, Auto-exposure, Manual and Auto-Iris, etc.	X			Prior to Deployment Complete	Inc 16	Prior to OTCM Operations	10 min each	YES
OCR VID 1 001	SPDM LEE Camera Basic Checkout	Verifies LEE CLA Video and Zoom working correctly	X				Prior to Deployment Complete	For SPDM LEE PDGF Grapple	10 min	YES
OCR VID 7.1 009 7.2 010	SPDM Video CLPA #1 & CLPA#2 Full Checkout	Verifies full CLPA #1 & CLPA#2 functionality (Pan/Tilt, Fast/Slow, zoom, focus, iris, etc.)	X			Prior to Deployment Complete		For Stabilization / R&R Operations	10 min each	YES
OCR VID 8.1 011 8.2 012	SPDM Video CLPA #1 & CLPA#2 Soft Stop Behavior	Verifies that when Pan/Tilt approaches soft stop then reaches the soft stop the motion will stop	X			Inc 16		For Stabilization / R&R Operations	5 min each	YES
BDU OCRs										
OCR BDU 1.0 001	SPDM BDU Diagnostic Tests	Verifies the proper functionality of the motor drive and motor interface between the SPDM BDU and OTCM mechanisms.	X			Prior to Deployment Complete		Prior to R&R Operations	5 min	YES
* OCR BDU 2.1 002	SPDM BDU Command of OTCM Gripper, Advance and Umbilical at High Voltage	Verifies the capability of powering up/down the BDU and operating the SPDM OTCM Mechanisms using BDU at High Voltage	X			Prior to Deployment Complete		Prior to R&R Operations	15 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
* OCR BDU 2.2 003	SPDM BDU Command of OTCM Gripper, Advance and Umbilical at Low Voltage	Verifies the capability of powering up/down the BDU and operating the SPDM OTCM Mechanisms using BDU at Low Voltage	X			Prior to Deployment Complete		Prior to R&R Operations	15 min	Following Unloaded SPDM GC Commiss.
* OCR BDU 2.3 004	SPDM BDU Command of OTCM Torquer at Low Voltage Clockwise	Verifies the capability of powering up/down the BDU and operating the SPDM OTCM Torquer using the BDU at Low Voltage	X			Prior to Deployment Complete		Prior to R&R Operations	15 min	Following Unloaded SPDM GC Commiss.
* OCR BDU 2.4 005	SPDM BDU Command of OTCM Torquer at High Voltage Counter Clockwise	Verifies the capability of powering up/down the BDU and operating the SPDM OTCM Torquer using the BDU at High Voltage	X			Prior to Deployment Complete		Prior to R&R Operations	15 min	Following Unloaded SPDM GC Commiss.
ROST Tool OCRs										
OCR ROST 1.1 001	ROST Holster Checkout Acquisition Part	Verifies the acquisition and release of the ROST from the tool Holster	X			Prior to Deployment Complete	Inc 16	For ROST Operations	30 min	Following SPDM GC **Loaded Ops** Commiss.
OCR ROST 1.2 002	ROST Holster Checkout Stowage Part	Verifies the stowage of the ROST into the tool holster	X			Prior to Deployment Complete	Inc 16	For ROST Operations	60 min	Following SPDM GC **Loaded Ops** Commiss.
OCR ROST 2.1 003, 2.2 004	ROST Dynamic Checkout Drive Mechanism	Verifies ROST MMF Operations. Checkout on its drive mechanisms	X			Prior to Deployment Complete	Inc 16	For ROST Operations	60 min	Following SPDM GC **Loaded Ops** Commiss.
RMCT Tool OCRs										
OCR RMCT 1.1 001 1.2 002	RMCT1 & RMCT2 Dynamic Checkout	Verifies MCF Collocated bolt actuation, launch restraint mechanism release, preload and drive open the launch restraint arms	X			Prior to Deployment Complete	Inc 16	For RMCT Operations	60 min each	Following SPDM GC **Loaded Ops** Commiss.
OCR RMCT 2.1 003 2.3 005	RMCT Holster Checkout: Acquisition RMCT1 & RMCT2	Verifies RMCT Holster operations by releasing each RMCT from its Holster's MCF	X			Prior to Deployment Complete	Inc 16	For RMCT Operations	60 min each	Following SPDM GC **Loaded Ops** Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	GROUND OPTION
OCR RMCT 2.2 004 2.5 006	RMCT Holster Checkout: Stowage RMCT1 & RMCT2	Verifies RMCT Holster operations by stowing each RMCT to its Holster's MCF	X			Prior to Deployment Complete	Inc 16	For RMCT Operations	60 min each	Following SPDM GC **Loaded Ops** Commiss.
SET Tool OCRs										
* OCR SET 1.1 001	SET Holster Checkout Acquisition Part	Verifies the release of the SET tool from the tool holster	X			Prior to Deployment Complete	Inc 16	For SET Operations	45 min	Following SPDM GC **Loaded Ops** Commiss.
* OCR SET 1.2 002	SET Holster Checkout Stowage Part	Verifies the re-securing of the SET tool into the tool holster	X			Prior to Deployment Complete	Inc 16	For SET Operations	60 min	Following SPDM GC **Loaded Ops** Commiss.
* OCR SET 2.1 003	Unloaded SET Dynamic Checkout	Verifies unloaded SET mechanism movement	X			Prior to Deployment Complete	Inc 16	For SET Operations	45 min	Following SPDM GC **Loaded Ops** Commiss.
* OCR SET 2.2 004	Loaded SET Dynamic Checkout	Verifies loaded SET mechanism movement	X			Prior to Deployment Complete	Inc 16	For SET Operations	45 min	Following SPDM GC **Loaded Ops** Commiss.

TABLE H-4.B SPDM INCREMENT 17 ON-ORBIT CHECKOUT REQUIREMENTS FOR SPDM COMMISSIONING COMPLETE

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
Power OCRs										
OCR PWR 8.1 061 8.2 062	SPDM OTCM1 & OTCM2 Payload Power Application	Demonstrates that Payload Power can be applied to the OTCM on Arm1 & Arm2	X				Inc 17	Prior to First CTC	5 min each	YES
OCR PWR 8.3 063	SPDM LEE Payload Power Application	Verifies payload power can be applied and removed from the SPDM Body LEE	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	YES

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR PWR 1.5 005, 1.6 006	SPDM PWR PDGF Arm 1/Arm2 Subsystem Off to Keep-Alive	Verifies the ability of the SPDM to transition from Off to KA, thus powering heaters and initializing 1553 comm between the CEU and SACU SRTs	X				Inc 17	Prior to SPDM Commiss. Complete	4 min	YES
OCR PWR 2.8 020	SPDM PWR LEE Body Subsystem Redundant Keep-Alive to Operational	Verifies the startup sequence and comm. with SACU DPRTs and all SPDM Subunits on Redundant string and LEE Interface	X				Inc 17	Prior to SPDM Commiss. Complete	4 min	YES
OCR PWR 3.6 030	SPDM PWR PDGF Body Subsystem Redundant Keep-Alive to Operational	Verifies the startup sequence and comm.. with SACU DPRTs and all SPDM Subunits on Redundant string and PDGF Interface.	X				Inc 17	Prior to SPDM Commiss. Complete	4 min	YES
OCR PWR 3.7 031	SPDM PWR LEE Body Subsystem Primary Operational to Keep-Alive	Verifies Body can transition from Operational state back to Keep Alive state on Primary string and LEE interface.	X				Inc 17	Prior to SPDM Commiss. Complete	2 min	YES
OCR PWR 5.9 049, 5.10 050	SPDM PWR LEE SACU1(SACU2) Keep-Alive to Off	Verifies transition of power from Keep-Alive state to Off. No telemetry is returned, heaters are off	X				Inc 17	Prior to SPDM Commiss. Complete	2 min	YES
OCR PWR 7.3 055, 7.4 056	SPDM PDGF Channel A(B) MLB	Verifies SPDM can be powered and communicate on MLB using either channel from the PDGF end	X				Inc 17	Prior to SPDM Commiss. Complete	2 min	YES
OCR PWR 8.3 063	SPDM LEE Payload Power Application	Verifies Payload power can be applied and removed from the SPDM Body LEE	X				Inc 17	Prior to SPDM Commiss. Complete	2 min	YES
OCR PWR 13.1 078, 13.2 079	SPDM Shutdown Body LEE Primary (Redundant)	Verifies that Primary(Redundant) Body LEE subunit can be shutdown	X				Inc 17	Prior to SPDM Commiss. Complete	2 min	YES
OCR PWR 13.3 080	SPDM Startup Body LEE (Primary)	Verifies that the Primary Body LEE subunit can be started up again after a shutdown	X				Inc 17	Prior to SPDM Commiss. Complete	2 min	YES
Body LEE OCRs										
* OCR LEE 4.2 008	SPDM OCR LEE Primary, Release - Slow	Demonstrates the SPDM LEE is able to initiate and complete a slow automatic release on the Primary string.	X				Inc 17	Prior to Deployment Complete	10 min	Following Unloaded SPDM GC Commiss.
* OCR LEE 3.2 006	SPDM OCR LEE Checkout – Redundant	Verifies that the SPDM LEE is able to initiate and complete a LEE Checkout command on the Redundant string.	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
* OCR LEE 4.2 008	SPDM OCR LEE Primary Release	Verifies the SPDM LEE is able to initiate and complete an automatic release of a grapple fixture on the primary string	X				Prior to Deployment Complete	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
* OCR LEE 4.4 010	SPDM OCR LEE Primary, Demate	Verifies an SPDM LEE demate operation on a PDGF	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
* OCR LEE 5.1 015	SPDM OCR LEE Manual Primary, Open Snare – Slow	Verifies that the SPDM LEE opens the snare mechanisms slow on the primary string	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
* OCR LEE 5.2 016	SPDM OCR LEE Manual Primary, Close Snare – Slow	Verifies that the SPDM LEE closes the snare mechanism slow on the primary string	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
* OCR LEE 5.3 017	SPDM OCR LEE Manual Primary, Retract Carriage – Slow	Verifies that the SPDM LEE retracts the carriage mechanism slow on the primary string	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
* OCR LEE 5.4 018	SPDM OCR LEE Manual Primary, Extend Carriage – Slow	Verifies that the SPDM LEE extends the carriage mechanism slow on the primary string	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
* OCR LEE 5.5 019	SPDM OCR LEE Manual Primary, Extend Latches – Slow	Verifies that the SPDM LEE extends the latch mechanism slow on the primary string	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
* OCR LEE 5.18 032	SPDM OCR LEE Manual Primary, Rigidize – Slow – Force Based	Verifies that the SPDM LEE is able to rigidize the grapple fixture slow on the primary string using position based termination	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
* OCR LEE 5.8 022	SPDM OCR LEE Manual Primary, Derigidize – Slow	Verifies that the SPDM LEE is able to derigidize the grapple fixture slow on the primary string	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
* OCR LEE 4.1 007	SPDM LEE Primary, Auto Capture – Force Based – Slow	Demonstrates the SPDM LEE is able to initiate and complete a slow automatic capture on the Primary string using force based termination.	X				1J/A Flight (Prior to Orbiter Departure)	For PDGF Grapple & 2J/A Operations	7 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
* OCR LEE 6.2 032	SPDM OCR LEE Semi-Manual Release – Slow, Primary	Verifies that the SPDM LEE is able to perform a LEE Semi-Manual Release command on the primary string using slow speeds	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 4.7 013	SPDM LEE Primary, Capture – Position Based	Demonstrates the SPDM LEE is able to initiate and complete a slow automatic capture on the Primary string using position based termination	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
OCR LEE 4.8 014	SPDM OCR LEE Redundant Capture – Fast – Position Based	Verifies that the Redundant SPDM Body LEE can capture a grapple fixture using a FAST capture command using position based termination	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 4.6 012	SPDM OCR LEE Redundant Release – Fast	Verifies that the Redundant SPDM LEE can release a grapple fixture using the FAST Release command	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 5.7 021	SPDM OCR LEE Manual Primary, Rigidize – Slow – Position Based	Verifies that the SPDM LEE is able to rigidize the grapple fixture slow on the primary string using position based termination	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 4.5 011	SPDM OCR LEE Redundant Capture – Fast – Force Based	Verifies that the Redundant SPDM Body LEE can capture a grapple fixture using a FAST capture command using force based termination	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 5.9 023	SPDM OCR LEE Manual Redundant, Open Snare – Fast	Verifies that the SPDM LEE opens the snare mechanisms fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
OCR LEE 5.10 024	SPDM OCR LEE Manual Redundant, Close Snare – Fast	Verifies that the SPDM LEE closes the snare mechanism fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
OCR LEE 5.11 025	SPDM OCR LEE Manual Redundant, Retract Carriage – Fast	Verifies that the SPDM LEE retracts the carriage mechanism fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
OCR LEE 5.12 026	SPDM OCR LEE Manual Redundant, Extend Carriage – Fast	Verifies that the SPDM LEE extends the carriage mechanism fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR LEE 5.13 027	SPDM OCR LEE Manual Redundant, Extend Latches – Fast	Verifies that the SPDM LEE extends the latch mechanism fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
OCR LEE 5.14 028	SPDM OCR LEE Manual Redundant, Retract Latches – Fast	Verifies that the SPDM LEE retracts the latch mechanism fast on the redundant string.	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.
OCR LEE 5.15 029	SPDM OCR LEE Manual Redundant, Rigidize – Fast	Verifies that the SPDM LEE is able to rigidize the grapple fixture fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 5.16 030	SPDM OCR LEE Manual Redundant Derigidize – Fast	Verifies that the SPDM LEE is able to derigidize the grapple fixture fast on the redundant string	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 6.3 033	SPDM OCR LEE Semi-Manual Capture – Fast, Redundant – Force Based	Verifies that the SPDM LEE is able to perform a LEE Semi-Manual Capture command on the redundant string using fast speed using force based termination	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCS LEE 6.6 036	SPDM OCR LEE Semi-Manual Capture – Fast, Redundant – Position Based	Verifies that the SPDM LEE is able to perform a LEE Semi-Manual Capture command on the redundant string using fast speed using position based termination	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 6.4 034	SPDM OCR LEE Semi-Manual Release – Fast, Redundant	Verifies that the SPDM LEE is able to perform a LEE Semi-Manual Release command on the redundant string using fast speed	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 6.5 035	SPDM OCR LEE Semi-Manual – Slow – Primary – Position Based	Verifies that the SPDM LEE is able to perform a LEE Semi-Manual Capture command on the Primary string at slow speed using position based termination	X			Prior to Deployment Complete	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following SPDM GC Contact Ops Commiss.
OCR LEE 1.2 002	SPDM LEU Diagnostics Test on Redundant String	Verifies the Redundant LEU is working correctly	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	YES
OCR LEE 2.2 004`	SPDM OCR LEE Calibration – Redundant	Verifies that the SPDM LEE is able to initiate and complete a calibration of the LEE Mechanisms and load cell on the Redundant string.	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	YES

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR LEE 3.2 006	SPDM LEE Checkout – Redundant	Verifies that the SPDM LEE is able to initial a complete LEE checkout command	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	YES
OCR LEE 5.17 031	SPDM LEE Manual Primary, Rigidize – Slow – Forced Based	Verifies the SPDM LEE rigidizes the grapple prove on slow speed using forced based termination.	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Loaded SPDM GC Commiss.
OCR LEE 5.6 020	SPDM LEE Manual Primary – Retract Latches – Slow	Verifies the SPDM LEE Latches can be retracted manually on slow speed.	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	Following Loaded SPDM GC Commiss.
Body Joint OCRs										
OCR BJEU 4 006	SPDM Body Joint Full Range Test	Verifies that the body roll joint can rotation to its +/- soft stop limit	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	15 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 5.3 009	SPDM BJEU Servo Brake Checkout for an Unloaded Body Joint (Primary) LEE End	Verifies that the SPDM Primary body joint responds to a “Null” input by successfully applying the servo brakes while unloaded and based on the LEE	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	15 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 5.4 010	SPDM BJEU Servo Brake Checkout for a Max Loaded Body Joint (Primary) LEE End	Verifies that the SPDM Primary body joint responds to a “Null” input by successfully applying the servo brakes while loaded and based on the LEE	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	15 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 5.5 011	SPDM BJEU Servo Brake Checkout for an Unloaded Body Joint (Redundant) LEE End	Verifies that the SPDM Redundant body joint responds to a “Null” input by successfully applying the servo brakes while unloaded and based on the LEE End	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	15 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 5.6 012	SPDM BJEU Servo Brake Checkout for a Max Loaded Body Joint (Redundant) LEE End	Verifies that the SPDM Redundant body joint response to a “Null” input by successfully applying the servo brakes while loaded and based on the LEE	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	15 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 8 018	SPDM BJEU – Pause, Resume, & Terminate	Verifies the SPDM Body Joint through an auto sequence in which it is paused, resumed and terminated	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 9 019	SPDM BJEU Rate Input Scale Selection	Verifies the rate scale input is changed and how this affects the SPDM performance.	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	10 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR BJEU 10 020	SPDM BJEU Rate Hold	Verifies that the SPDM is capable of maintaining a rate command with constant HC input	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	30 min	Following Unloaded SPDM GC Commiss.
* OCR BJEU 11 021	SPDM BJEU Operator Commanded Joint Position Auto Sequence Mode	Verifies the ability of the SPDM to rotate about its body joint to a target position.	X			Inc 16	Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 14 024	SPDM BJEU Simulated Direct Drive Test	Verifies driving the Body Joint with no feedback control.	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 5.2 008	SPDM SJEU Servo Brake Checkout for an Unloaded Body Joint (Redundant)	Verifies that SPDM Redundant Body Joint responds to a null input appropriately.	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 12 022	SPDM BJEU Pre-stored Joint position auto-sequence mode	Verifies that the SPDM Body joint is capable of rotating to the selected joint position in a joint autosequence file.	X				Inc 17	Prior to SPDM Commiss. Complete	30 min	Following Unloaded SPDM GC Commiss.
OCR BJEU 13 023	SPDM SJRM Mode	Verifies the body roll joint in Single Joint Rate Mode	X				Inc 17	Prior to SPDM Commiss. Complete	30 min	Following Unloaded SPDM GC Commiss.
MISC OCRs										
OCR MISC 4 004	SPDM Redundancy Management Evaluation	Verifies the capability of transitioning control of the SPDM from the Active RWS to the Monitoring RWS	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	YES
* OCR PWR 2.7 019	SPDM Power LEE Body Subsystem Primary Keep-Alive to Operational	Verifies the startup sequence and communication with the Body Primary subunits when based on the LEE.	X				Inc 17	Prior to Deployment Complete	10 min	YES
OCR MIS 2 003	SPDM Selective Safing	Verify that all SPDM Subsystems can be manually safed via the PCS GUI	X				Inc 17	Prior to SPDM Commiss. Complete	5 min	YES
OCR MISC 6 006	SPDM Miscellaneous Thermal Data Analysis OCR	This OCR is used for thermal data trending		X			Inc 17	Prior to SPDM Commiss. Complete	Trending while Operational and No Motion	YES
OTCM OCRs										

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR OTCM 4.9 029	SPDM OTCM Automatic Mate	Demonstrates that an SPDM OTCM is able to perform the mate maneuver automatically	X				Inc 17	Prior to First CTC	5 min	Following Unloaded SPDM GC Commiss.
OCR OTCM 4.10 030	SPDM OTCM Automatic Demate	Demonstrates that an SPDM OTCM is able to perform the demate maneuver automatically	X				Inc 17	Prior to First CTC	5 min	Following Unloaded SPDM GC Commiss.
OCR OTCM 5.9 041	SPDM OTCM Manual Mate	Demonstrates the SPDM OTCM manual mate command in preparation for mating with ORUs and payloads	X				Inc 17	Prior to First CTC	5 min	Following Unloaded SPDM GC Commiss.
OCR OTCM 5.10 042	SPDM OTCM Manual Demate	Demonstrates the SPDM OTCM manual demate command in preparation for mating with ORUs and payloads	X				Inc 17	Prior to First CTC	5 min	Following Unloaded SPDM GC Commiss.
OCR OTCM 2.5 007 2.8 010	SPDM OTCM1 & OTCM2 Advance Calibration	Verifies the SPDM OTCM1 & OTCM2 calibration of the advance mechanism	X				Inc 17	Prior to SPDM Commiss. Complete	5 min each	Following Unloaded SPDM GC Commiss.
OCR OTCM 2.1 003, 2.2 004	SPDM OTCM1(2) Calibration	Verifies the OTCM mechanisms can be calibrated in preparation for contact operations.	X				Inc 17	Prior to SPDM Commiss. Complete	5 min each	YES
OCR OTCM 3.9 019, 3.10 020	SPDM OTCM1(2) Torquer Checkout	Verifies the SPDM checkout of the torquer mechanism	X				Inc 17	Prior to SPDM Commiss. Complete	5 min each	YES
Arm Joint OCRs										
OCR SJEU 32 051	SPDM SJEU Simulated Direct Drive Test	Verifies the direct drive control for both SPDM arms	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 25 031	SPDM Kinematic Validation Check	Verifies that the SPDM Kinematics Check is functioning and determines whether a desired trajectory is within the manipulator reach envelope	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 3.1 005, 3.2 006	SPDM Arm1(2) Joint Diagnostics Brake Test	Verifies that the SPDM Arm brakes are working correctly through 4 brake tests	X				Inc 17	Prior to SPDM Commiss. Complete	5 min each	YES
OCR SJEU 27.1 034, 27.2 055	SPDM Line Tracking Joint(POR)	Verifies that the Line Tracking feature using Joint Position (POR), is working properly to correct POR trajectory errors	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR SJEU 10 013	SPDM POR Rate Limit Selected	Verify that the operator is able to select SPDM POR translational and rotational rate limits	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 11 014	SPDM Rate Input Scale Selection	Verify the operator is able to set the vernier and coarse rate scale factors between min and max values to convert the HC deflection to the desired rate command	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 12 015	SPDM Rate Hold	Verify the rate hold feature is working properly.	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 15 019	SPDM MAM Checkout	Verify that the MAM control mode is working properly with the required accuracy and resolution	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 16 020, 16.2 020	SPDM OCPM Checkout Arm1(2)	Verifies that the OCPM control mode is working properly with the required accuracy and resolution	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 17 021	SPDM OCJM Checkout	Verifies that the OCJM control mode is working properly with the required accuracy and resolution	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 18 022	SPDM PPAM Checkout	Verifies that the PPAM control mode is working properly with the required accuracy and resolution	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 19 023	SPDM PJAM Checkout	Verify that the OCPM Control mode is working properly with the required accuracy and resolution.	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 20.1 024, 20.2 025	SPDM Hot Stick/Manaul Position and Orientation Hold Selection	Verify that the Hot Stick & Manual Position/Orientation hold feature is working properly.	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 21 026, 22 018	SPDM BLOCS / SOCS Coordinate Frame Checkout	Verifies the BLOCS/SOCS coordinate frame	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 23.1 028, 23.2 029	SPDM Tip Speed Performance Test Min(Max) Joint Rates	This test is to collect data for validation of the performance of ground engineering models	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 24 030	SPDM APPC Mode	Verifies that the APPC Control Mode is working properly with the required accuracy and resolution	X				Inc 17	Prior to SPDM Commiss. Complete	30 min	Following Unloaded SPDM GC Commiss.

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR SJEU 25 031	SPDM Kinematic Validation Check	Verifies that the SPDM Kinematics Check determines whether a desired trajectory is within the manipulator reach envelop.	X				Inc 17	Prior to SPDM Commiss. Complete	20 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 26.1 032, 26.2 033	SPDM Singularity Management 6(7) DOF	Verifies that the SPDM singularity management is working properly	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 28 035	SPDM Base Joint Locking	Verifies that the base joint lock control feature.	X				Inc 17	Prior to SPDM Commiss. Complete	30 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 29 048, 30 049	SPDM Shoulder (Wrist) Cluster Internal Collision Check	Verifies that the SPDM detects the Shoulder (Wrist) cluster internal collision and responds appropriately	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 31 050	SPDM Cross Cluster Collision Check	Verifies the SPDM detects the Cross Cluster Collision and responds appropriately	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 32 051	SPDM SJEU Simulated Direct Drive Test	The role of the direct drive OCR is to drive each joint with no feedback control	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
OCR SJEU 34 040	SPDM DJOPS Checkout	Verifies SPDM Arm Control in a DJOPS mode.	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following Unloaded SPDM GC Commiss.
EOTP/OTP OCRs										
OCR EOTP 1 001	SPDM EOTP Checkout – Rotate Joint	Verifies that the EOTP can be actuated to rotate its joint a full 180 degrees.	X				Inc 17	Post EOTP / SPDM Integration	5 min	Following SPDM GC Contact Ops Commiss.
OCR EOTP 2 002	SPDM EOTP – Power Application	Verifies that the PSU can supply electrical power to the EOTP	X				Inc 17	Post EOTP / SPDM Integration	5 min	YES
OCR EOTP 3.1 003	SPDM EOTP – Engage Joint Lock	Verifies that the EOTP joint lock can be engaged	X				Inc 17	Post EOTP / SPDM Integration	5 min	Following SPDM GC Contact Ops Commiss.
OCR EOTP 3.2 004	SPDM EOTP – Disengage Joint Lock	Verifies that the EOTP joint lock can be disengaged	X				Inc 17	Post EOTP / SPDM Integration	5 min	Following SPDM GC Contact Ops Commiss.
FMS/FMA OCRs										

Task Number	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase			Comments	
			Once	Per.	Cond.	Desirable	Highly Desirable	Mandatory	Execution Time est.	Ground Option
OCR FMA 5 011	SPDM CMT without stabilization	Verifies that SPDM FMA CMT without stabilization is functioning correctly	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following SPDM GC Contact Ops Commiss.
OCR FMS 3.1 005, 3.2 006	SPDM FMS Arm1(2) FMS Drift	This OCR is performed to assess the sensitivity of the FMS Sensor to Thermal variations	X				Inc 17	Prior to SPDM Commiss. Complete	3 orbits, each arm	Following SPDM Unloaded GC Commiss.
OCR FMA 5.0 011	SPDM FMA CMT without Stabilization	Verifies SPDM FMA CMT operations without stabilization	X				Inc 17	Prior to SPDM Commiss. Complete	60 min	Following SPDM Loaded GC commiss.
Video OCRs										
OCR VID 3 002	SPDM LEE Camera Full Checkout	Verifies all LEE camera related functionality	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	YES
OCR VID 5.1 005, 5.2 006	SPDM Video OTVC1(2) Full Checkout	Verifies all OTVC camera related functionality	X				Inc 17	Prior to R&R Operations.	10 min	YES
OCR VID 7.1 009, 7.2 010	SPDM Video CLPA1(2) Full Checkout	Verifies all CLPA camera related functionality	X				Inc 17	Prior to SPDM Commiss. Complete	10 min	YES
OCR VID 8.1 011, 8.2 012	SPDM Video CLPA1(2) Soft Stop Behavior	Verifies that when Pan/Tilt approaches soft stop limits motion will stop	X				Inc 17	Prior to SPDM Commiss. Complete	5 min each	YES

TABLE H-5 FLIGHT 1J AND STAGE 1J JEM ON-ORBIT CHECKOUT REQUIREMENT TASKS

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
JEMRMS Partial Deploy											
TBD	F1J-15	JCP FAS Local Command Checkout for JEMRMS Ops.	TBD	X					During Flight 1J	Crew time TBD	
JEMRMS Final Deploy including break checkout											

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
TBD	F1J-30	JEMRMS Break Checkout	Perform brake checkout for JEMRMS MA.	X					During Flight 1J	Crew time 1hr 40min	Crew time includes JEMRMA maneuver to stow position and brake C/O.
JEMRMS Backup Drive System checkout											
TBD	F1J-31	BDS Checkout	Perform BDS checkout for interface of 1553B communication between BUC and RLT-BU(RMS Mon 1, 2), ACU E-Stop function, JEUs (PDB RMS, RMS Mon 1,2) and JEU matrix command function, and checkout for Remote Interface Panel Back-Up (RIP-BU) and RMS Mon switches in BDS configuration #1A.	X					During Flight 1J	Crew time 2hr 40min SSIPC Ops. 1hr 20min	Crew time includes preparation and cleanup.
JPM/JLP system checkout											
JPMHR27	S1J-18A	JPM High Rate Data Checkout Via HRMS Repeaters	Confirm high rate data downlink from PDH b via HRMS repeater #1(#2,#3).	X					During Stage 1J	Crew time 30[minutes] SSIPC Ops.	
JPMNW03	S1J-18A	JPM AEP Checkout	Verify AEP/DIU_a2 communication.	X					During Stage 1J	SSIPC Ops.	
JPMNW04	S1J-18A	JEM File Uplink And Downlink	Verify file uplink and downlink correctly performed.	X		X			During Stage 1J	SSIPC Ops.	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
JPMNW05	S1J-18A	JPM SLBUS 1 And SLBUS 2 Communication Checkout	Verify SLB1_communication .	X		X			During Stage 1J	SSIPC Ops.	
JPMNW06	S1J-18A	JPM SLBUS 1 And SLBUS 2 Communication _Checkout	Verify SLB2 communication.	X		X			During Stage 1J	Crew time 60 [minutes] SSIPC Ops.	
JPMNW11	S1J-18A	JEM PLB 3 Communication Checkout	Verify communication between PDH a and PLT on PL Bus 3 ch A, B. And also verify communication between PDH b and PLT on PL Bus 3 ch A, B.	X		X			During Stage 1J	Crew time 60[minutes] SSIPC Ops.	
JPMSC04	S1J-18A	JCP Switchover	Perform manual JCP switchover.	X		X			During Stage 1J	SSIPC Ops	
JPMHR25	S1J-18B	JPM PDH High Rate Data Checkout Via APS	Verify PDH High rate data via APS.	X					During Stage 1J	SSIPC Ops.	
JPMMR01	S1J-18B	JPM Medium Rate Data Checkout Via IPU	Confirm medium rate data transmit from MLT and checkout PEHG Health and Command Response.	X					During Stage 1J	SSIPC Ops.	
JPMNW08	S1J-18B	RYUTAI Rack Communication Checkout	Verify communication between PDH a and ISPR A3 on PL Bus 1B ch A, B via HRDL.	X		X			During Stage 1J	SSIPC Ops.	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
JPMNW09	S1J-18B	SAIBO RACK Communication Checkout	Verify communication between PDH b and ISPR A2 on PL Bus 1B ch A, B via HRDL.	X		X			During Stage 1J	SSIPC Ops.	
JPMVD59	S1J-18B	JPM TVC INT P &S Camera Checkout	Verify JPM INT P&S TVCs function and controllability Confirm video image from TVC INT S&P to WS monitor and ground. Opearte TVC INT S&P by CCP.	X					During Stage 1J	Crew time 120 [minutes] SSIPC Ops.	
JPMVD61	S1J-18B	JLP TVC INT O Camera Checkout	Verify JPM INT O TVC function and controllability Confirm video image from TVC INT O to WS monitor and ground. Opearte TVC INT O by CCP.	X		X			During Stage 1J	Crew time 60 [minutes] SSIPC Ops	
JPMVD62	S1J-18B	JPM TVC EXT F&A Camera Checkout	Verify JPM EXT F&A TVC function and controllability. Confirm video image from TVC EXT F&A to RMS monitor and ground. Opearte TVC EXT F&A by CCP.	X					During Stage 1J	Crew time 120 [minutes] SSIPC Ops.	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
JPMVD67	S1J-18B	JEM Video Routing	Route video signal from ISPR A2 to ISPR A3.	X		X			During Stage 1J	SSIPC	
JPMSC10	S1J-18C	JPM and JLP Fire Indicator Checkout	To verify JLP, JEMRMS Rack, ISPR A2 and ISPR A3 fire alarm indicator healthy for the first time. To verify JEMRMS alarm indicator healthy To verify JPM alarm indicator healthy	X					During Stage 1J	Crew time 30 [minutes] SSIPC Ops.	
JPMSC11	S1J-18C	JPM RACK POWER SWITCH Checkout	To verify the rack power switch (JAXA ISPR #2, #4) works nominal for the first time.	X					During Stage 1J	Crew time 30 [minutes]	
JPMPT05	S1J-18D	HCTL A,B and JLP HCTL Power Consumption Check	To verify HCTL power consumption nominally.	X					During Stage 1J	SSIPC Ops.	
JPMPT06	S1J-18D	JPM PTCS Heater Checkout	To change JEM heaters operation state and to acquire shell temperatures.	X					During Stage 1J	SSIPC Ops.	
JPMEL01	S1J-18E	JPM and JLP Air Sampling Line SOV Checkout	To verify gas sampling valves work nominally	X					During Stage 1J	SSIPC Ops.	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
JPMEL02	S1J-18E	JPM Cabin Temp Control Checkout	To verify cabin temperature control capability	X					During Stage 1J	SSIPC Ops.	
JPMEL03	S1J-18E	JPM Cabin Pressure Sensor Checkout	To verify JPM pressure sensors work nominally	X		X			During Stage 1J	SSIPC Ops.	
JPMAT01	S1J-18F	JPM TCS Mode Transition (2WCL to A1WCL/A1WCL to 2WCL)	To verify A1WCL transition and temperature control function. To verify TWMVs work nominally. To verify 2WCL from A1WCL transition.	X					During Stage 1J	SSIPC Ops.	
JPMAT03	S1J-18F	JPM MTL FAA Checkout	To verify MTL FCVs (FEHX a, b, ISPR A2, A3) work and flow rate nominally.	X					During Stage 1J	SSIPC Ops.	
JPMAT04	S1J-18F	JPM LTL FAA Checkout	To verify LTL FCV (ISPR A2) work and flow rate nominally.	X					During Stage 1J	SSIPC Ops.	
JPMFD01	S1J-18G	JEM Smoke Detector Data Acquisition	To record the SD data - JPM SDs - JLP SDs - ISPR A2/A3 SDs	X					During Stage 1J	SSIPC Ops.	
JPMFD02	S1J-18G	JPM ISPR A2/A3 AAA Checkout	To verify JPM A2/A3 AAA fun works nominally.	X					During Stage 1J	SSIPC Ops.	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
JPMES01	S1J-18G	JPM-Vacuum Vent Function Check	To verify vaccum ventting function.	X					During Stage 1J	Crew time 60 [minutes] SSIPC Ops.	
JPMES02	S1J-18G	JPM-Vacuum Vent Leak Check	To verify vacuum vent leak rate.	X		X			During Stage 1J	Crew time TBD [minutes] SSIPC Ops.	
JPMES03	S1J-18G	JPM Waste Gas (WG) Vent Function Check	To verify Waste Gas(WG) ventting function.	X					During Stage 1J	SSIPC Ops.	
JPMES04	S1J-18G	JPM Waste Gas(WG) Vent Leak Check	To verify WG leak rate.	X		X			During Stage 1J	SSIPC Ops.	
JPMES05	S1J-18G	JPM ISPR Solenoid Valve Checkout	To verify solenoid valves work nominally	X					During Stage 1J	Crew time 60 [minutes] SSIPC Ops.	
JPMES06	S1J-18G	JPM CGSE Pressure Sensor Checkout	To verify CGSE sensors work nominal.	X					During Stage 1J	Crew time 60 [minutes] SSIPC Ops.	
TBD	S1J-18H	JPM AIRLOCK INITIAL Checkout	To release launch lock of slide table by removing the release bolts. To confirm connection of connector mechanism of slide table. To checkout slide table to move toward cabin side.	x		x			During Stage 1J	Crew time 120 (TBD) [minutes]	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
TBD	S1J-18 (TBD)	JEMRMS File Transfer Checkout	TBD	X					During Stage 1J	Crew time TBD	
Initial checkout of 2 Japanese payload racks (RYUTAI and SAIBO)											
TBD	S1J-19	SAIBO Rack Initial Checkout	Perform SAIBO rack C/O below; CBEF function, CB function, MMA function.	X		X			During Stage 1J	Crew Time 14:55 (+2:40*)	Preparation time for 2 Japanese payload rack (SAIBO/RYUTAI) checkout is 2:40*.
TBD	S1J-19	RYUTAI Rack Initial Checkout	Perform RYURAI rack C/O below; IPU function, SCOF function, PCRF function, FPEF function, MMA function.	X		X			During Stage 1J	Crew Time 16:15 (+2:40*)	Preparation time for 2 Japanese payload rack (SAIBO/RYUTAI) checkout is 2:40*.
ICS/PROX rack initial checkout											
TBD	S1J-20	JPM ICS PM Checkout	TBD	X		X			During Stage 1J	SSIPC Ops. 1[hr](TBD)	
Initial checkout and 2J/A commissioning checkout of JEMRMS including BDS											
TBD	S1J-21	JEMRMS Checkout (C/O) #1	Perform JEMRMS Main Arm (MA) function checkout below: manual operations checkout (C/O), dynamic response test, region check function C/O, End Effector (EE) C/O in manual mode.	X					During Stage 1J	Crew time 7[hrs]	Crew time includes preparation and cleanup.

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
TBD	S1J-21	JEMRMS C/O #2	Perform JEMRMS MA function C/O below with BDS: EE C/O with JPM EXT A camera, Video Light Unit (VLU) MA EE C/O, Frame of Resolution (FOR) (Joint) Auto and FOR (Joint) OCAS, manual and single joint ops, active EFBM nadir side visual inspection, dynamic response test in MA Stowed Position	X					During Stage 1J	Crew time 6 hr 40min	Crew time includes preparation and cleanup.
TBD	S1J-21	JEMRMS C/O_#3	Perform JEMRMS MA function checkout below: overlay display, manual ops to JLP GF, EE C/O in auto mode for JLP GF, Split screen	X					During Stage 1J	Crew time 6hr 40min	Crew time includes preparation and cleanup.
TBD	S1J-21	JEMRMS Ranging Operation Validation (Part 1)	Acquire the camera views of EFU13 target on JLP required for calibrations of TVC MA EE and encoders of joint angle data. Also evaluate the dependency of ranging results on a thermal environment.	X					During Stage 1J	Crew time 6hr 40min	Crew time includes preparation and cleanup.

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
TBD	S1J-21	JEMRMS Ranging Operation Validation (Part 2)	Maneuver JEMRMS to evaluate the calibration result with the data acquired in Ranging Ops Validation Part 1. Also evaluate arm tip trajectory error and arm positioning functionality when maneuvering JEMRMS along the L-shaped trajectory.	X					During Stage 1J	Crew time 6hr 40min	Crew time includes preparation and cleanup.
JPMVD64	S1J-21	JEMRMS End Effecter TVC Checkout (TBD)	To verify JEMRMS EE TVC function and controllability	X		X			During Stage 1J	Crew time TBD [minutes] SSIPC Ops.	This task is under review.
PROX initial functional checkout											
TBD	S1J-22	HTV PROX RF Checkout	Check PROX RF function performances using ground station in TNSC. This activity is performed from the ground.	X					During Stage 1J	TNSC	TNSC: Tanegashima Space Center
TBD	S1J-22	HTV PROX BBP Checkout	Check PROX BBP function performances using ground station in TNSC. This activity is performed from the ground.	X					During Stage 1J	TNSC	

Task Number	IDRD Section 6	Checkout Task	Description	Type of OCR Required			Priority and Required Operations-Phase (Joint Operations/Stage Operations, Options)			Comments	
	Task Reference [1]			One-Time Activation	Periodic	Conditional	Desirable	Highly Desirable	Mandatory	Special MCC/ISS/ Shuttle Resources	Notes
TBD	S1J-22	HTV PROX HCP Checkout	Check PROX BBP function performances using HCP and ground station in TNSC. Check the command send from HCP is received by ground HTV Simulator.	X					During Stage 1J	Crew time 4:25 (TBD) TNSC.	Crew time includes the installation of HCP and cables, the HCP C/O and the cleanup of PROX checkout by crew.

APPENDIX I - SHUTTLE FLIGHT TRANSFER PRIORITY LISTS

[Items for Russian Review will be Identified with (RUSSIAN)]

I.1 1J Transfer Priority List <TBD I-1>

Flight 1J Integrated Middeck Launch and Return Priorities

Flight 1J TPL will be provided after the L-6 month Manifest baseline. Users may contact the respective Launch Package Team for the preliminary version of the TPL.

I.2 ULF2 Transfer Priority List <TBD I-1>

Flight ULF2 Integrated Middeck Launch and Return Priorities

Flight ULF2 TPL will be provided after the L-6 month Manifest baseline. Users may contact the respective Launch Package Team for the preliminary version of the TPL.

APPENDIX J - OFF-NOMINAL SITUATIONS <TBR J-1>

[Items for Russian Review will be Identified with (RUSSIAN)]

TABLE J-1 FLIGHT *XX* OFF-NOMINAL SITUATIONS MATRIX

ONS Number	Task	Cause	Consequences	Response/Task
XX-1				
XX-2				
XX-3				
XX-4				
XX-5				
XX-6				
XX-7				
XX-8				
XX-9				
XX-10				

APPENDIX K - USOS RESOURCES TO BE PROVIDED FOR FLIGHT 16 SOYUZ VISITING CREW MEMBER <TBD K-1>

(REQUIREMENTS BETWEEN NASA AND *INTERNATIONAL PARTNER*)

Table K-1, USOS Resources to be Provided for 16 Soyuz Visiting Crewmember, is limited to the below-listed and agreed-to resources that NASA will provide to the 16 Soyuz crewmember during this mission on 16 Soyuz. The listing of utilization to be performed during the 16 Soyuz mission will be provided via Rocket Space Corporation - Energia (RSC-E) and is listed in the main document under Paragraph 6.2, Increment 17 Specific Requirements. NASA agrees to provide the following resources and will be compensated by **<TBD K-1>**.

TABLE K-1 USOS RESOURCES TO BE PROVIDED FOR 16 SOYUZ VISITING CREWMEMBER

Resource	Agreements
E-mail	
IP Phone	
Timeline	
Procedures	
Lab Facilities	
Ham * Not solely a USOS resource - International Hardware	
Imagery	
PAO	
Medical	
Crew Provisions (including USOS food):	
Exercise Equipment	
Video Down	
Up/Downlink Data (includes OCA)	
Ground Support	
Preflight Crew Training for Prime and Backup *X* Crewmembers	